Curtin University Sustainability Policy Institute

Underwater Photoelicitation: A New Experiential Marine Education Technique

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This thesis is presented for the Degree of

Doctor of Philosophy

of

Curtin University

May 2013

Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

Signature: ……..

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Abstract

Psychologists generally agree that the rapid introduction and widespread use of new technologies is leading to ever-greater physical and psychological disconnection between humans and the non-human world. This disconnect is proving harmful to both individuals and the rest of the natural Earth community (Gaia). Developing educational techniques that reverse this destructive trend is of the upmost importance. Underwater photoelicitation is a new experiential environmental education technique designed for this purpose.

This thesis describes and assesses underwater photoelicitation for its effectiveness as an educational tool within the context of community and school programs. Two separate groups, one comprising adults and one, high school students, were given underwater cameras and sent on snorkeling journeys during which they were instructed to photograph their experiences. Participants were then interviewed using individual and group photoelicitation methodologies. This technique was created to combine a relatively new technology, inexpensive digital underwater cameras, and direct experience in the non-human world with the goal of reconnecting humans to the rest of nature. This project marks the first time that underwater photoelicitation appears in environmental education research.

The theoretical framework was nested within ecopsychology, deep ecology, and conservation psychology. The use of mixed methods (qualitative and quantitative) resulted in a more robust data analysis and led to a better understanding of underlying learning processes. The research was predominantly qualitative, and major themes were developed from questionnaires and interviews. Pre- and post-quantitative surveys provided insight into attitude change and intention to act with pro-environmental behavior.

Although underwater photoelicitation was effective at increasing awareness, eliciting emotional reactions, and fostering a sense of connection to the ocean, it was not necessarily effective at promoting positive attitudes and behaviors. Interestingly, while some attitudes about and behaviors toward the ocean did become more positive, others appeared to become more negative. This complex relationship between an outdoor experiential education program and environmental attitudes and behavior comports with previous environmental education research.

In conclusion, underwater photoelicitation is an effective technique for increasing awareness of and developing an emotional connection to the ocean. Nevertheless, if the goal is to achieve significant attitude change and pro-environmental behavior, the technique must be supplemented not only with factual information regarding ecology/human impacts but also with strategies for empowering individuals to act.

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Acknowledgements

I would like to express great gratitude to my supervisor Laura Stocker, Ph.D., of Curtin University's Sustainability Program for her continued patience and guidance while I was working through the long process involved in obtaining a Ph.D. Dr. Stocker was always available to answer my questions and always willing to sit down and help me work out the tough problems.

I also extend gratitude to my aunt Marilyn Riley, who spent long hours editing this thesis. Without her extensive knowledge of the English language, her passion for its proper use, and her inquisitive mind, the editing of the thesis would have been much more solitary and time consuming. Thank you too to her husband Robert Grand, who never complained about my intrusion into their lives.

The research underlying this thesis would have been even a greater challenge without the support of Richard Swan and the rest of HotRock, a charity whose goal is creating and implementing sustainability curricula in schools. HotRock not only supported my efforts to create and write the underwater photoelicitation curriculum but also helped me contact a large number of schools to advertise Show Us Your Ocean! (SUYO!).

In addition I want to acknowledge the local high school teachers who generously volunteered their time to SUYO! and the students and adults who participated in the program. Without their involvement, underwater photoelicitation would still be just a theoretical concept.

I am, of course, extremely grateful for the scholarships from Curtin University that gave me the financial stability to pursue the research.

I am grateful to my friends and musical family for sharing in this awesome musical journey that is just beginning. Without music and your openhearted sharing, I don't know how I could have completed this project.

Lastly I would like to thank my parents, Kathryn Riley and Brian Andrews, my sister Jane Andrews, my uncle Walt Oechel, my aunt Judy Oechel and my wonderful dog Mackey for their support during these years. They are an invaluable part of my life. Thank you for so much love!

My First Adventure with the Ocean

When I was seven years old, I had the good fortune to join my uncle and his friend on a fishing trip to Baja California on my uncle's small motorboat. The first part of the journey was calm as we slowly worked our way down the coastline. I watched as we moved past the dry, hazy Baja desert and the Tijuana slums on one side and the Coronado Islands on the other. These islands protect the inshore waters from the Pacific Ocean, whose potential turbulence can belie its name. On this initial leg of the journey, all that we had to be vigilant about were patches of kelp, seaweed that grows up to a foot a day and thrives in the cold, nutrient rich waters of Baja California.

By the end of the day, we had pulled into Ensenada, a major port in Baja California Norte. Surrounded by arid hills, the city overlooks a huge bay. The headland of the southern part of the bay towered over the calm waters that were then turning red from the setting sun. That night we anchored our boat in the port, and I remember hearing noises from the busy streets--cars horns honked, music played,

people laughed and yelled. It all seemed distant, as if that world were totally separate from our little boat floating serenely on the dark waters.

The next morning we were up early to continue our way south. As we moved past the protective islands, the vast Pacific Ocean opened up. Although this vastness could have been overwhelming, I felt completely connected to the watery world around me. The fresh smells of the breathing sea, the moistness of the surrounding air, the gentling rolling motion of the swells entranced me.

However, later in the day, the weather began to change. The sky darkened, and clouds soon obscured the sun. The swells picked up substantially as we passed around the southern headland of the bay. The early morning calm was suddenly transformed. Despite the fact that my uncle and his friend grew increasingly nervous, I remained hypnotized by the manifesting power of the sea that I could feel building beneath me.

The swells grew ever larger. The boat would come to the crest of a swell, head down its face, then come back up and repeat the motion over and over again. Still this motion of the sea kept me transfixed.

The rain began pounding our little boat, hammering against the small plastic-lined cabin where we huddled. Outside the wind howled. Later I would learn that the waves were 16 feet high and that they could have easily caused our boat to capsize. These were very big seas for such a tiny vessel.

My uncle listened attentively to the VHS radio, calling out to any vessels that might know of a safe harbor. Through the static, through the beating rain, through the shuddering and slamming of the boat by those giant swells, a voice came over the radio. A large yacht, more than 100 feet long, had been forced to seek shelter from the storm. We began communicating with its crew, who were able to help us locate where the yacht had anchored.

Motoring toward the safe harbor, we could see only the explosions of whitewater as the waves hit the barren sandstone cliffs. We did not find our anchorage until after night had fallen. However, because of the churning seas and the impenetrable darkness, we had no reference point for dropping the anchor. Without electronic GPS, we had to take a leap of faith; hoping that it would hold, we dropped anchor. Being only seven years old and assuming everything was under control, I went to bed and slept soundly. Later I learned that my uncle had stayed up all night, keeping watch over our precarious situation.

The next morning broke, and invigorated by the past night's adventure, I leapt up to see that the sun was rising over the ocean, illuminating the desert rocks with soft pink hues. The wind was light. The clouds were scattered over the horizon. Although the anchor had dragged and we were dangerously close to shore, we had survived the storm.

Chapter 1- Introduction

> Humans, like other animals, are shaped by the places they inhabit, both individually and collectively. Our bodily rhythms, our moods, cycles of creativity and stillness, even our thoughts are readily engaged and influenced by seasonal patterns in the land. Yet our organic attunement to the local earth is thwarted by our ever-increasing intercourse with our own signs. Transfixed by our technologies, we short-circuit the sensorial reciprocity between our breathing bodies and the bodily terrain. Human awareness folds in upon itself, and the senses – once the crucial site of our engagement with the wild and animate earth – become mere adjuncts of an isolate and abstract mind bent on overcoming an organic reality that now seems disturbingly aloof and arbitrary.
> (David Abram: The Spell of the Sensuous: Perception and Language in a More-Than-Human World (Vintage), Page: 267

1.1- Background to the Study

With the increasingly rapid creation and utilization of new technologies, society is becoming ever more disconnected from the non-human world. This thesis focuses on fostering re-connection to that world, specifically to the ocean, through direct experience and the use of technology (Depending on how it is used, technology can either hinder or be helpful to the development of our consciousness.) The thesis is written to be a gift to all who care about our planet in that it describes a powerful new technique that helps people re-discover their connection to the non-human world and through this process inspire them to explore and to protect our home.

Human Impacts on the Ocean

The Earth has always existed in a state of flux. However, contemporary humans are not only speeding up many natural processes of change but also causing major extinctions of species on a rapid scale (Steffen 2007). That one organism has

effected so much change so rapidly is dangerous for all life on the planet. And that we have wreaked this havoc despite the fact that we are part of the biosphere, completely dependent on the complex relationships that we have co-evolved with, is almost incomprehensible.

As the human population grows to immense proportions, we are rapidly consuming marine resources. I have witnessed fish populations drop dramatically in the waters off Southern California, where I grew up. When I was young, I could expect to catch a fish every time that I went out on the water. Unfortunately this is no longer the case. Fish stocks have been decimated by both commercial and recreational fishing (Jackson, Kirby et al. 2001). Each day huge areas of habitat are destroyed by bottom trawling (Kaiser and Spencer 1996). There are plastic patches in each central gyre of the ocean that are bigger than the largest of the US states, and they are poisoning millions of marine organisms (Moore, Moore et al. 2001). The acidification of the oceans that results from increasing carbon emissions can lead to drastic changes in the ocean ecosystem (Orr, Fabry et al. 2005). The warming of the planet and the melting of the sea ice at the poles could possibly alter major oceanic currents (Rahmstorf 1997). All these processes are occurring at the present moment.

Human Connection to the Ocean

We evolved from the ocean, and she sustains us. She, along with forests, is the lungs of the planet, and she breathes for us. Approximately half of the oxygen that you take into your lungs originates from phytoplankton in the ocean (Karl, Laws et al. 2003) With every breath that you take, you take in a part of the ocean. We depend on the ocean for 20% of our global protein supply (Woods Hole 2012). The ocean regulates the climate of the planet. The ocean provides transport for our society and drives the world's major economic engines. The ocean offers recreation to those humans who have been lucky enough to develop a relationship with her. We cannot live without the ocean, but she can live without us.

I try to live my life as much as I can with an active connection to the ocean. At this point, I interact mostly through surfing, a physically demanding yet exhilarating and rewarding experience. What captures me about surfing is the purity

of being on a wave and moving my body to the rhythm of the ocean, reading the sea and flowing with the water.

Human physical evolution is connected to these kinds of interactions with the natural environment; we gained skills and kept fit though our everyday movements, our everyday interpretation and reading Earth in which we were completely immersed. We observed visually what we saw around us in the non-human world, taking it all in and ascribing meaning to what we saw (Abram 2011). Many indigenous societies held intimate connections with the land and communicated with it through rituals and other sacred practices. It was understood that a balance existed and was to be maintained for the health of the community and the health of the surrounding land (Abram 1997).

Sources of a Sense of Disconnection

Natural fear and apprehension exists towards the ocean because we humans are terrestrial beings (even though our original evolutionary source is the ocean), and entering its vast, powerful and fluxing energy is often uncertain and dangerous. On land we experience gravity, feel the solid ground underneath our feet, walk upright, and breathe air directly. We have evolved intimate relationships between the birds, reptiles, mammals, trees, grasses, rocks, hills, mountains and other beings that inhabit the land with us. We are ecologically defined by our interactions and connections with terrestrial organisms (Abram 1997).

However, when we enter the ocean waters our method of direct interaction changes completely. We are no longer upright and grounded and we can no longer just sit down if we are tired. The soil is no longer supporting us and we feel a sense of weightlessness in the water. We have to keep moving, we cannot stop all of our movements or else we will drown. From our perspective, soil is stable, a bed that we can surrender to, whereas the waters of the ocean are constantly in a flux, in flow. The creatures in the ocean also present us with something foreign. In an evolutionary sense humans would have only interacted with these organisms in tide pools or when things were washed ashore from the ocean depths or from a simple canoe. On an evolutionary time scale, only recently have we begun navigating this vast fluid expanse as our human technology has developed. The ocean still is mostly

unexplored and presents a last frontier that we will probably never fully understand. This confuses and challenges humanity. We are confronted by a place on Earth that we are totally a part of, yet separate from. It is almost as if we live in a world with two worlds, one on which we have raised families and nations, and one which is almost alien.

The contemporary media, which use fear as a way to engage, often sensationalize fearful aspects of the ocean. People are almost hypnotized by the raw power that the ocean and its creatures possess, for example waves and sharks. Many people are do not interact in the ocean because they are afraid. The 'separateness' between humans and the ocean is, in this way, strengthened and a sense of connection, diminished. If the complexity of the ocean is reduced and all people can think about are the dangers that the ocean presents to a human life, then the ability for people to treat the ocean with respect is less likely.

Theoretical Frameworks of the Research

How do we research, understand, and start to change our human centered attitudes and perspectives to becoming more aware, respectful and connected to the non-human world? This thesis involves two different schools of understanding the human-nature relationship and working towards the goal of sustainability; ecopsychology/deep ecology and conservation psychology.

Ecopsychology and Deep Ecology

Ecopsychology and deep ecology call for experiential and emotional connections with the non-human world in order to help foster the *discovery* of one's ecologic and developing the awareness of an ecologic unconscious. These aspects of human awareness are often described with spiritual connotations, and indeed, many authors within ecopsychology and deep ecology view the natural world with reverence. Within these fields there is a call for direct, sensory experiences in the natural world to increase awareness and a sense of connection (Abram 2011). Research within these fields is predominantly qualitative.

We are also disconnecting psychologically from the biotic and physical world that we have evolved with, and this disconnect has negative impacts on human health and psychology (Roszak 1995). According to deep ecologists and ecopsychologists, among others, the health of the human psyche and the health of the non-human world are completely linked (Roszak 1995; Bragg 1996). We have lost awareness of our ecologic selves—the knowledge that we are completely part of the biotic web around us. An ecologic unconscious refers to the understanding that the physical and mental well being of humanity is connected to the well being of the planet, and that when one suffers, the other suffers as well (Smith 2010). *Conversely, when one is healthy, the other has a better chance of being healthy.* The affirmation of the existence of an Ecological Self as well as an Ecologic Unconscious allows for humans to *understand* and *feel* that we are completely and inextricably linked to the ecosystem and life around us. We are co-evolving with what we evolved from, and any damage done to the ecosystem around us impacts us because we are part of the web (Naess 1995).

Conservation Psychology

In contrast, the field of conservation psychology, which is more empirical in nature, is concerned with exploring connections between the study of human behavior and the achievement of conservation goals (Clayton and Myers 2009). Conservation psychology calls for a better understanding of how attitudes about the environment change and how changed attitudes affect behavior.

The current research applies these two epistemologically different schools of thought and explores the possibility of integrating them. Experiences and emotions are key components of ecopsychology and deep ecology. Understanding and changing environmental attitudes and behavior are fundamental to conservation psychology.

1.2- Research Method: Underwater Photoelicitation

Humanity's dependence and increasing impact on our ocean ecosystems demonstrate the need for greater awareness and protection of the coast and seas. I suggest here that innovative, experiential marine educational tools/programs designed to connect humans meaningfully to the ocean world may be a useful way to support its protection.

I believe we must enliven the senses through direct experiences in nature, share new perspectives of the non-human world, and truly feel that we are an integral part of our environment. We must also be able to retain the memory of those perceptions, feelings, tastes, movements, and emotions of direct experiences in nature. How can we do this?

Direct Outdoor Experience and Photoelicitation

This thesis combines two learning approaches:

- Direct Outdoor Experience

Direct experience in the ocean is called for in order to increase awareness of the marine environment. Experiential marine education programs have been shown to be more effective at increasing awareness and fostering a sense of connection with the marine environment than with classroom-based programs (Stepath 2006).

- Photoelicitation

Photoelicitation is a research method using photographs (often taken by the participant) as a focus in an interview (Harper 2002). Photoelicitation and other visual learning methods have been used successfully in education about the terrestrial environment; the combination of experiential and visual learning can create a powerful educational tool (Loeffler 2004; Beilin 2005). Photoelicitation may be a way to enable and enhance ecologically sustainable thinking (Bergmann 1999/2000).

Humans are excellent visual learners, and we have evolved using our eyesight as a highly significant sense (Swanston and Wade 2001). Photography has been proven to be a highly engaging and evocative research tool (Collier and Collier 1986). Taking photography in nature and using these images to recall and describe experiences has been proven to be a successful qualitative research technique (Loeffler 2004).

I have developed underwater photoelicitation as a modification of the above process. Participants use waterproof cameras to capture the marine environment, and are subsequently interviewed about their photos. The final component of the process is a workshop in which the group of participants shares their favorite images. Underwater photoelicitation is a new technique undocumented in the academic literature. This technique was expected to elicit the same kinds of responses in the participants as terrestrial photoelicitation because both are engaging with the non-human world.

Research Participants

This study encompasses two age groups: adults and high school aged students. The adult study was completed first because it was thought they would have greater experience in the ocean and give richer qualitative data than high school aged students. It was also assumed that adults would have greater experience with photography and working with adults presented fewer ethical challenges than did minors. Adult environmental education is a subset of environmental education and discusses the opportunities and challenges of engaging adults with environmental education. Adult environmental education is described in the following chapter.

High school students were the next focus after the adult study. Underwater photoelicitation seeks to give youth a potential for having a *significant life experience* with regards to the ocean. Significant life experiences are formative experiences in nature that people experience when young (Chawla 1998). The theory behind reaching out to young people is that if environmental educators can give youth a chance to connect with the non-human world before they are molded into modern day society, then there is a better chance that as adults their connection to nature will be stronger. When youth are confronted with all the ills of society, there

could be a greater chance that they recognize humanity does not exist within a vacuum and that they are a part of a beautiful mosaic that is life. When people can understand that the breath that we take in was crafted by the leaves of a tree in the neighborhood park or by plankton in the ocean just offshore, then they will begin to see the bigger picture.

Origins of the Concept

I started doing underwater photography in 2006, having bought my own camera, housing, strobe and fish eye lens. I was studying marine biology at James Cook University in Townsville, Australia and was fortunate to take an underwater photography course at the end of the semester taught by master underwater photographer Kevin Deacon. I gained valuable skills and experience taking photos of the Great Barrier Reef, an ecosystem with many inspiring elements to photograph. From there, I was motivated to continue my photography whenever I could, diving in California and taking pictures. Taking a successful underwater photo is not an easy thing to do, and a photographer will usually take many photos before getting a satisfactory one. Underwater photography is technically very challenging, equipment is still extremely expensive and you must dive in order to get photos. Therefore, this particular type of nature photography is not as accessible as many other land-based methods.

I discovered re-usable digital underwater cameras that cost $40 each. I knew how much underwater photography moved me and had thought a lot about the potential for underwater photography to help people connect on an emotional level to the ocean. So the idea was born that day to get people to go and snorkel and take pictures of the ocean. Soon after I discovered photoelicitation and other existing research techniques that harnessed the potential that photography offers for social research. However, I was disappointed by the lack of literature on using participant-driven photography to help people connect directly and develop a sense of connection with the non-human world. Underwater photoelicitation has never been formally assessed for its educational potential or used in a participant-driven process.

This thesis is the story of the evolution and evaluation of underwater photoelicitation and the stories that young people and adults got to tell about their experiences in the ocean through this technique.

1.3- Aim of the Research

Aim

The aim of the research is to examine whether underwater photoelicitation is an effective and feasible methodology for ocean based experiential education within the context of adult community and youth school based programs.

The experiential marine education program designed to test this new technique is called Show Us Your Ocean! (SUYO!). The process of underwater photoelicitation was tested using as subjects both adult residents of a coastal community (Dunsborough, Western Australia), and high school students from inland and coastal regions of Perth.

The name "Show Us Your Ocean!" was chosen because the program was intended to allow people to discover what the ocean means to them, through direct experience and photography, and give them the tools to portray the ocean how they saw it. My intention was not to teach the participants how to think about the ocean. The program was run in three phases: a pilot study, community workshops, and high school classes.

Major Questions and Themes of the Research

- Does underwater photoelicitation increase awareness, foster a sense of connection, change attitudes and foster positive environmental actions towards the oceans?

Presentation of the research is organized around four major themes that emerged from consideration of the data—awareness of the environment, sense of connection to the environment, attitudes toward the environment, and intention to act regarding the environment. It is important to note that some overlap exists between

definitions of these themes as they are used within the model. For example, affective components of attitudes *are* emotions, and behavioral components of attitudes *are* intention to act. The four themes and their significance within the context of the thesis are defined and explained below.

Awareness of the Environment

For the purposes of this theme, awareness is defined as comprising both experiential and knowledge-based components. Experiential awareness occurs while one is observing an environment and absorbing its various sights, sounds, smells, and textures. For example, when SUYO! Participants snorkeled, they saw fish, algae, and jetty pylons, heard clicking shrimp, and smelled the seaweed. This kind of observational and sensory (visual/perceptive/cognitive) engagement is a core principle of the current research.

Knowledge-based awareness—that is, learning about ecology and human impacts—comes from information gained through either individual learning or classroom instruction. SUYO!'s lack of enough emphasis on this component came to light after the program data were analyzed. The analysis clearly demonstrated that experiential environmental awareness alone does not provide people with the cognitive framework to place themselves within the broader biotic community. A lack of knowledge about human impacts results in a lack of awareness about how people influence the biosphere.

Sense of Connection to the Environment

As set forth in Chapter Two (Literature Review), for the purposes of this theme, sense of connection means that an individual knows and feels that she/he is not separate from the rest of the world. This understanding can take on spiritual connotations with a person becoming highly empathetic and expansive (Bragg 1996). For example, surfers often experience the marine environment in this way (Taylor 2007). Deep ecologists write that this connection is not a "sense of similarity" but is instead a "sense of commonality," "belonging," and "community" (Fox 1995; Diehm 2007).

Ecopsychology and deep ecology focus on fostering the emotional connections to nature that are essential for the realization of one's ecologic self/unconscious. These connections, which are often triggered by a significant life experience (Chawla 1998), are powerful precursors of personal wellbeing and environmental action (Kals, Schumacher et al. 1999; Pooley and O'Connor 2000; Mayer 2004). One of my significant life experiences occurred when I was five years old and took an adventurous ocean journey on my uncle's boat, described in the introduction.

I hypothesize that if a person has a positive reaction to snorkeling in the ocean, he/she is more likely to develop greater environmental sensitivity through an increased sense of connectedness.

Attitudes About the Environment

As set forth in Chapter Three (Research Design), for the purposes of this theme, attitudes are defined as comprising three components: cognitive, affective, and behavioral. The methodology of the current research is framed by this tripartite model (Ajzen & Fishbein, 1980; Eagly & Chaiken, 1993; Kaiser, et al., 1999).

Examining attitudes is important if researchers want to understand how people relate to and feel about the natural world. Understanding and helping shift attitudes is important for encouraging behavior change. Thus if educators can foster positive attitudes toward the ocean, they might temper the negative things that popular culture commonly associates with the marine environment—sharks, big waves, dangerous currents, etc. Such an attitude shift can lead to more interaction with the ocean, and positive attitudes formed by direct experience can be predictors of responsible environmental behavior (Kaiser, Wolfing et al. 1999).

'Attitudes' is a broad-brush definition and encompass perspectives, sense of connection, affective responses (emotional components of attitudes) and intention to act. These more specific components of attitudes are described separately in the qualitative research, and the 'attitudes' is rarely used. On the other hand, the 'attitude' is used frequently in the quantitative data and is linked to the questions that relate to environmental attitudes.

Intention to Act Regarding the Environment

As set forth in Chapter Three (Research Design), for purposes of this theme, intention to act is an individual's statements regarding future behavior. Necessary to understanding how an environmental education intervention can change future behavior recognizing how an intention to act is formed. An explanation of this process is found in the theory of planned behavior, which discusses the link between intention to act and attitudes (Ajzen 1991). The current research describes how direct experience in the marine environment combined with underwater photography changes attitudes and affects intention to act—both positively and negatively—with regard to environmental behavior. As part of an increased sense of ownership in the ocean, a person might, for example, become more conscious of the need to ameliorate negative human impacts on the marine environment. Intention to act data was taken from both the qualitative and quantitative components of the research.

1.4- Significance of the Research

This research addresses the need for the creation and assessment of new visually based, experiential marine educational techniques in order to help foster connection to the ocean. Since humans learn more deeply from experiences, and engage well with visual education methods, the combination of these two learning aspects is justifiable (Kolb 1984; Ibanez 2004).

Experiential marine education has not tested/utilized photoelicitation as a research methodology, and this study is the first of its kind. Furthermore, there has been little research focusing on participants' direct experiences of the marine environment within the context of marine education. This thesis is one of the few to describe direct participant experiences in the ocean. Underwater photoelicitation is a new research method and is a significant new contribution to marine education.

New technologies are coming onto the market now at ever-decreasing prices, which allow for innovative educational tools to be developed. Technology at the present time presents us a duality; becoming more isolated from nature because of

increased use of technology, or using that technology in a useful way to help people re-connect to the Earth.

There is no better time than the present to start to integrate these new technologies to assist environmental education endeavors. Children and adults alike are now drawn to an electronic screen more than they are to direct experiences outside. This trend is becoming more widespread, especially with children, and its negative influence on the human psyche only getting stronger (Louv 2008).

In the current study, cheap digital re-usable underwater cameras allow participants to directly engage with the ocean and record and share their experiences. Two years prior, a study of this size would not have been possible due to the limiting factor of the costs of processing film.

1.5- Overview of the Study

The following chapter (Chapter 2) introduces the framework and theory that the thesis employs and nests the research with the context of environmental and marine education. It describes the disciplines that are employed to frame the research: ecopsychology/deep ecology and conservation psychology. It introduces and explains how the method of photoelicitation has been used previously for research.

Chapter 3 explains the research design, describes how and why awareness (experience and knowledge based), connections (emotional and spiritual), attitudes, and intention to act interact, and justifies why mixed methods (both qualitative and quantitative data) are used. It also describes the adult and school-based research program designed to test underwater photoelicitation: Show Us Your Ocean!

Chapters 4, 5, and 6 describe the qualitative themes that emerge from the research (adult, student, and teacher respectively).

Chapter 7 describes the results of the quantitative data that emerged from the school programs.

Chapter 8 is a final discussion, comparing and contrasting adult community and youth school based findings and describing limitations and the potential for future studies.

Chapter 9 is the conclusion.

Note: There are potential biases in the research and these are listed below.

- I knew some of the adult participants previous to the workshop, so this could have had a possible effect on how the interviews were conducted and how the results were interpreted.
- I have participated in many activist actions and hold strong spiritual beliefs regarding the world and environmental issues and have tried to keep my attitude as neutral as possible during the research, allowing for participants to develop their own connections to the marine environment and trying to keep my biases out of the interpretation of results.

Chapter 2- Theoretical Framework

This chapter contains a review of the literature that deals with theories relevant to the framing of my research. Framing has been a challenge because researchers who study the human-nonhuman connection use an epistemological trichotomy of normative, behavioral, and critical methodologies, each with its own unique approach to the topic. The first methodology comprises, for example, ecopsychology, which is grounded in depth psychology, deep ecology, and sometimes spirituality. In contrast, the second methodology, conservation psychology, focuses on an empirical understanding of how knowledge and attitudes affect environmental behavior. Finally, the critical methodology, photoelicitation, allows for the participants to take ownership of the research process. I, as the researcher, had little to no influence on the photos or their experiences in the ocean environment (except for helping choose the snorkeling sites for the schools).

In reviewing and analyzing the human-nature connection, my emphasis is on the integration of the first two methodologies, with less focus on the third. I also look at educational research, which maps into all three epistemologies.

Section 2.1- Ecopsychology

This section contains an exposition of ecopsychology—the essential understanding of the relationship between human psychology and the nonhuman world. This chapter explores and explains linkages between the wellbeing of the planet and the wellbeing of humans. Ecopsychology is aimed at helping humans repair our present physical and psychological disconnect from Earth, which is so apparent in Western culture. This discipline is foundational to my research and forms the theory behind the justification for fostering emotional and experiential connections to nature.

Section 2.2- Conservation Psychology

This section introduces conservation psychology, a field that explores the relationship between humans and the nonhuman world on an empirical basis and

aims to discover techniques that lead to the conservation of the natural world. This section calls for more rigorous and scientific methods of examining and changing environmental attitudes in order to foster pro-conservation behavior.

Section 2.3 – Environmental Education (EE)

This section describes the historical roots and fundamental aspects of environmental education, whose goal is to foster the positive learning experiences that occur when humans make direct contact with the natural world. It also explains the need for outdoor experiential EE, discusses how EE and education for sustainability are linked, and sets forth the processes involved in experiential EE programs. Finally, this section reviews the theory and practice of these kinds of programs as they are used in Australian school (youth) and community (adult) settings.

Section 2.4- Marine Education

This section introduces marine education and explains its historical roots, fundamental aspects, and application in Australia.

Section 2.5- Photoelicitation

This section introduces photoelicitation as a research methodology and examines a few pertinent case studies. The strengths and weaknesses of this approach are discussed through an analysis of the literature. Photoelicitation is this thesis's main research technique.

2.1- Ecopsychology

History of Ecopsychology

Ecopsychology is based on the works of such thinkers as Aldo Leopold, a University of Wisconsin professor influential in the development of contemporary environmentalism. In 1949, Leopold published The Sand County Almanac, which first described his concept of a land ethic and its dual mandate—the pursuit of a respectable, responsible relationship between humanity and the nonhuman world and the recognition that, dependent as we are on the broader ecosystem, we must feel part of the natural community around us. "We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect." (Leopold 1949) Other academics subsequently echoed Leopold on the need for a holistic ethic of the land (Wilson 1978; Cramer 1998; Pretty 2002; Orr 2004).

Ecopsychology itself was first described by Theodore Roszak, a professor of history at California State University, East Bay and an astute observer of social and environmental conditions. In 1992, Roszak published The Voice of the Earth (Roszak 1992), the seminal book on ecopsychology, in which he highlighted the failure of modern psychological studies both to value the link between humanity and nature and to recognize its influence on the human psyche (Roszak 1995; Smith 2010). To cure this failure, Roszak developed the discipline of ecopsychology, which he saw as a way of bridging the "historical divide between the psychological and the ecological" (Snell 2011).

A key principle of this discipline is the assertion that connection to nature is a fundamental component of a healthy psyche that leads to a positive relationship with the Earth and with ourselves. Although Roszak did not explicitly use the word, this connection is essentially spiritual (Snell 2011). He believed that humans should feel a part of nature completely, intensely, and eternally (Roszak 1992; Roszak 1995; Mayer 2009; Snell 2011).

Many ecopsychologists view the human-nonhuman nature connection from a psycho-spiritual perspective as a reflection of an individual's sense of self—that is,

his or her self-concept (Baillie 2003). Although every person's soul/spiritual experiences with nature are different, they are all equally important to becoming aware of connection (Plotkin 2008).

To foster and protect this connection, Roszak advocated an animistic perception that would counter the effects of our urban-industrial, scientifically minded culture, which he considered destructive to both ecological systems and the human psyche. He wrote that humanity must cultivate an indigenous ethos in order to reinvigorate our ancient animism (Roszak 1992)

During the 20-plus years that have passed since Roszak's advocacy of animism, a discussion has begun within ecopsychology that centers on the role of indigenous worldviews in the development of a contemporary ecological ethic. Commentators generally agree that it is important both to recognize the spiritual connections that indigenous societies have traditionally had to their environment and to acknowledge the psychological benefits that these connections reap. However, they also emphasize that we in Western culture must develop our own psychic/soul connections and not be dependent on or glorify indigenous beliefs (Perluss 2010). As Betsy Perluss states, we, on an individual level, must "feel" nature on our own and not merely romanticize the indigenous worldview. She has called the Western tendency to put indigenous societies on a pedestal an "Avatar" fantasy (Perluss, 2010).

In a 1995 book, Ecopsychology: Restoring the Earth, Healing the Mind, Roszak futher refined the fundamentals of ecopsychology through a collection of articles by prominent psychotherapists, eco-activists, and academics**.**
According to Roszak, if the natural world is included in a sense of self, any kind of destruction of nature will be interpreted as self-destruction (Roszak 1995). Moreover, empathy and relatedness on an individual level are extremely important, for they foster motivation to change our environmentally destructive ways (Mayer 2004).

Principles of Ecopsychology

> "At its core, ecopsychology suggests that there is a synergistic relation between planetary and personal well being; that the needs of the one are relevant to the other." (www.ecopsychology.org)

Ecopsychology is an integration of ecology, psychology, and spiritual philosophy and tends to be more subjective in its study of the effects of nature on the human psyche and the emotional connections humans have with our natural environment than are other related fields. In studying the human-non-human nature connection, ecopsychology looks at such subjective issues as "emotion, personal meaning and transcendence, mystery, mysticism, despair and empowerment, critiques of the status quo, and ecocentric visions for a different kind of society all together" (Doherty 2010). Additionally ecopsychological research examines the effect that direct contact with the natural world has on ecological thinking, personal growth, and psychotherapy.

There are four main tasks that ecopsychologists use to frame their work: They are the psychological, philosophical, practical, and critical (Fisher 2002). The psychological task aims to understand and re-frame the nature-human connection as a *relationship.* The philosophical task reintegrates the psyche (soul) into the non-human world. The practical task is the creation of therapies that help humans remember how their psyche and the psyche of the non-human world are linked. If successful, these therapies can foster an ecologic-based society. Finally, the critical task challenges the anthropocentric worldview of modern society and seeks to replace it with an ecocentric one (Fisher 2002).

One of the main principles of ecopsychology is that no separation exists between humans and the rest of nature. Some observers suggest the universal existence of an "ecologic unconsciousness" that is similar to E.O. Wilson's biophilia hypothesis, which asserts that we have an intrinsic biological affinity with nature because we are not biologically apart from it (Roszak 1992; Kellert and Wilson 1995).

In contrast the dualistic, dominant Western view of self is self-concerned and self-contained, seeing each individual as independent of and separate from the rest of the world. I argue here, with the ecopsychologists and deep ecologists, that this view is ultimately a destructive social construction (Gergen 1985; Markus 1991; Baillie 2003) that has damaged both the environment (ecological destruction) and humanity (negative psychological tendencies such as alienation, grief, and despair) (Roszak 2001; Smith 2010). Also with the ecopsychologists, I believe that both the spiritual/soul connection that humans have with the rest of the natural world and our

relationship with the Earth shape our psychological wellbeing and the wellbeing of the planet (Roszak 1995). If we assume the validity of this argument, it follows not only that an important pathway to planetary health is through an experiential and psychological re-connection that often assumes spiritual connotations (Roszak 1995; Fisher 2002; Davis 2006; Perluss 2010; Snell 2011) but also that a cognitive and emotional awareness of this connection encourages more pro-environmental behavior (Roszak 1992; Amel, Manning et al. 2009).

To achieve this goal, ecopsychology seeks ways in which to shift negative emotions regarding environmental issues to positive emotions and proactive action.

> Emotional knowing is as important, and sometimes more important, than conceptual knowing, especially if we need to summon the psychic energy to meet the ecological crisis that we currently face. (Tacey 2009) (p.11-12)

Both the causes of and solutions to the present day environmental problems stem from the human psyche, especially from the way in which we see ourselves in relation to the non-human world. And of course this self-identification affects how we act in this world. (Davis 2006). This awareness can be fostered, for example, by meditating, directly experiencing nature, building sustainable communities, and restoring ancient earth-based activities (Davis 1998; Beringer 2003; Kingsley and Townsend 2006). Our senses are the meeting point for the human-nature connection, and if we can be more fully aware of them, we can start listening to the Earth again (Sewall 1995).

According to ecopsychological theory, ego forms a false separation among individuals and between an individual and the rest of nature. Ecological self-consciousness (sometimes referred to as self realization) involves understanding and ultimately transcending the egoic notion of self (Fox 1990; Fisher 2002). Therefore, as individuals, we should undertake practices that allow us to become more aware of our ego-based consciousness and start becoming more aware individual and collective heart-based consciousness. Betsy Perluss and David Tacey write that one possible way to once again become aware of our individual connections to Earth is through the exploration of our unconscious. In order to start to realize our ecologic unconscious we need to confront and witness our individually repressed shadow (Tacey 2009; Perluss 2010). As we increase our awareness, witness, and let go of

these aspects of our egoic shadow selves, we start to allow heart consciousness to become more prevalent in our lives. As our awareness becomes more heart chakra based and less focused on the will and ego, our ecologic unconscious becomes more present in our awareness simply because heart consciousness and ecologic consciousness are one in the same. As we develop compassion for ourselves, we develop compassion for other humans and the rest of the non-human world. We begin to see the inherent reflection and feel the duality between humans and the non-human world dissolve (Davis 1998).

Warwick Fox has written that ecological identification consists of three different components including personal identification (a sense of commonality), ontological identification (spiritual realization of commonality), and cosmological identification (Fox 1995).

Deborah Du Nann Winter described three necessary psychological shifts in the development of ecologic self-awareness: conceptual/cognitive, perceptual/sensory, and spiritual. These psychological shifts are away from the dominant anthropocentric thinking toward ecocentric based thinking and feeing (Winter 1996).

Both the Fox and the Winter conceptualizations help us understand the alteration in identification of self that is necessary for the creation of a more connected worldview. Ecopsychology posits that once these shifts in awareness start taking place, individuals will begin seeing themselves less separate from nature (Bateson 2000). As a result of this alteration in perception, caring for nature will become a part of caring for self. This evolution results from humans' deep rooted instinct for self defense and does not need a "code" of environmental ethics to set forth the kinds of behaviors that are appropriate vis-à-vis the natural environment (Fox 1995; Baillie 2003).

Role of Ecopsychology

The first generation of ecopsychologists, including Roszak, separated empirical science from spiritual or transcendent ecological experiences, arguing that the two are fundamentally antagonistic and that the former is incompatible with the creation of a pro-environmental psyche and attendant pro-environmental behavior

(Snell 2011). However, this dichotomous understanding has begun to fall out of favor with commentators. Since its beginning in 2009, *Ecopsychology,* which is the field's first peer-reviewed journal, has been successful in encouraging new, less bifurcated approaches to research in this field.

As the field expands, ecopsychology practitioners and academics are exploring ways in which to incorporate more trans-disciplinary methods into their research (Smith 2010; Kamidin, Muda et al. 2011). However, at the same time, they recognize that too much movement in this direction would encroach on fields such as environmental psychology that use empirical methods to study human knowledge, attitudes, and behavior towards the Earth. In order to avoid this encroachment, ecopsychology, in its second-phase expansion, highlights and studies humans' spiritual and emotional connections to the rest of the natural world. In the December 2010 issue of the Ecopsychology, Thomas Doherty wrote: "the *Ecopsychology* journal aspires to speak, not only to the head, but also to the heart and to the whole" (Doherty 2010).

Relationship to Deep Ecology

Deep ecology is a very similar field to ecopsychology as both are working to redefine the way the dominant culture views the human non-human relationship. Deep ecology has a more biological basis to its philosophical core, while ecopsychology, is, as its name implies, more psychological. Deep ecology views all of the Earth as equal and having legal rights for existence (Naess 1973).

Norwegian philosopher Arne Naess coined the term deep ecology in 1973 (Naess 1973). Naess promoted an ecological worldview in which all forms of life have a right to exist and no species takes precedence to exist over others, specifically addressing the human non-human world relationship. Humans are inextricably linked to the rest of the ecologic web of life, and rather than adopt an anthropocentric worldview, deep ecologists argue for a biocentric worldview (Seed 2004). Deep ecologists use the principals of scientific ecology to support their view that humans and the non-human world are completely connected.

I use the term 'ecologic self' along with 'ecologic unconscious' in this thesis. Ecologic self is a term derived from deep ecology and describes self-actualization, or

the transcendence of one's ego-self. The ecologic-self is concerned for others out of compassion and a fundamental understanding that there is no separation between the individual and other humans, and humans and the non-human world (Bragg 1996). The ecopsychological term 'ecologic unconscious' refers to a similar level of awareness or consciousness. Therefore, in this thesis, they are sometimes used interchangeably.

Relevance for Thesis

This thesis uses an empirical-analytical approach to assess whether spiritual and emotional connections to nature can develop as a result of experiential marine education. Data collected are primarily qualitative, though in some cases results are aggregated across various indicators to give semi-quantitative results.

2.2- Conservation Psychology

This section introduces conservation psychology (CP) and discusses how the theoretical underpinnings of this field inform the examination of environmental attitudes in the research.

Definition of Conservation Psychology

> Conservation psychology is the scientific study of the reciprocal relationships between humans and the rest of nature, with a particular focus on how to encourage conservation of the natural world. Conservation psychology is an applied field that uses psychological principles, theories, or methods to understand and solve issues related to human aspects of conservation. It has a strong mission focus in that it is motivated by the need to encourage people to care about and take care of the natural world. In addition to being a field of study, conservation psychology is also the actual network of researchers and practitioners who work together to

understand and promote a sustainable and harmonious relationship between people and the natural environment. (Saunders 2003, p. 138)

Conservation psychology is not a sub-discipline of psychology but rather a 'super field' that encompasses a large range of psychological and other disciplines as shown in figure 1. CP aims to utilize aspects of each field to further its major goals of protection and conservation of the natural world (Saunders 2003). The chart below, taken from *The Emerging Field of Conservation Psychology* by Carol Saunders, compares CP to Conservation Biology and shows how both pull different fields together for a common goal.

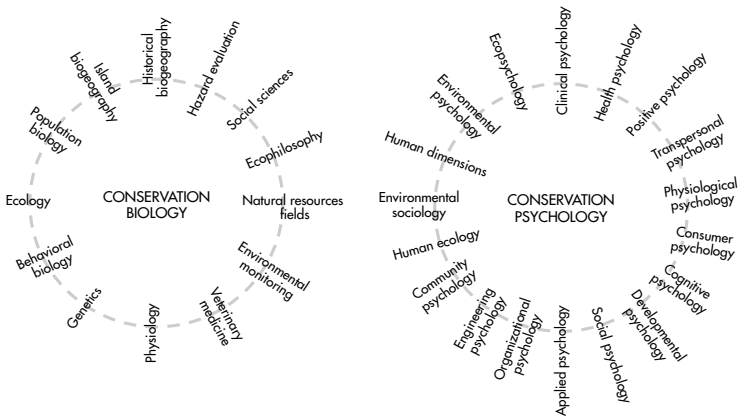


Figure 1. Conservation biology and conservation psychology combine other fields and sub disciplines toward conservation-related missions from (Saunders 2003, p. 139).

History of Conservation Psychology

Conservation psychology is a recent field, with the majority of scholarly articles and the first textbook having been written in the first decade of the 2000s. Although CP contains elements of many different fields, it most closely resembles environmental psychology (EP). Because CP's roots stem from environmental psychology (EP), a brief history of EP will be given. However, it is important to

note that EP is a sub-discipline of psychology, while CP is a super field, bringing together multiple fields of study for a common goal (Saunders 2003).

EP studies the interactions between humans and the environment, including social, built, and natural environments and sees the human-environment *system* as a holistic entity (Gifford 2009). EP's earliest practitioners were Kurt Lewin and Roger Barker, who, at the turn of the last century, promoted the study of humans as part of their environment rather than isolated from it. They found that the effect of environment on psychological state is highly significant, and their approach expanded the scope of contemporary psychology. In 1968, Barker found that physical environmental settings has the potential to strongly influence inter-personal behavior (Barker 1968). In order for findings to be truly applicable to every day behavior, psychological studies should not be undertaken not in laboratory settings but rather in natural environments where the subjects can interact normally. Then later in the 20th century, their approach grew to include the question of not only how the natural environment affected humans but also how humans affected the natural environment (Clayton and Myers 2009).

Carol Saunders, in an article entitled *The Emerging Field of Conservation Psychology,* discussed the need for a field that "created stronger connections between 'the natural and social sciences, between research and practice, and between psychology and the other social sciences" (Saunders 2003, p. 137). CP brings together researchers in different disciplines who could study more holistically the ways in which humans can achieve a more sustainable and conservation-minded society. In 2009 Susan Clayton and Gene Myers published the first CP textbook, and the field continues to expand with research into environmental psychology, environmental sociology, social psychology, community psychology and cognitive psychology (Saunders 2003; Clayton and Myers 2009).

Role of Conservation Psychology

According to the first major textbook in this super-field, "Conservation Psychology" by Susan Clayton and Gene Meyers, CP is 'mission-driven' and is aimed at "promoting human well-being by way of attending to nature, because the two are inseparable" (Clayton and Myers 2009, p. 11). In order to understand human

attitudes towards the ocean and the rest of the non-human world, an approach which is able to model attitudes is necessary to adopt. Conservation psychology employs the cognitive, affective, behavioral model in order to better understand attitudes; this theory is used heavily in the thesis. This model will be explained in the following chapter, Research Design.

Conservation psychology seeks to address the following aspects of the human-nature relationship:

i) How humans care about nature;
ii) How humans behave towards nature;
iii) How humans develop beliefs and knowledge about nature;
iv) How human-to-human relationships are relevant to conservation; and
v) How humans relate to social institutions (Mascia 2003; Saunders 2003)

Relationship Between Ecopsychology and Conservation Psychology

Environmental psychology and conservation psychology are similar to ecopsychology in that they all bridge the gap between ecology and psychology in their study of the connections and relationships between the human and the non-human world. However, CP bases itself in mainstream psychology and draws from a scientific, reductionist, rationalist, and anthropocentric worldview, while ecopsychology attempts to address these biases of mainstream scientific thought and uses an ecocentric worldview. Although these two approaches seem very different, some conservation psychologists have called for CP to integrate some of ecopsychology's perspectives and areas of study (Kidner 1994; Beringer 2003).

In an article entitled *A Conservation Psychology with Heart* (2003), Almut Beringer called for CP to include *spiritual* along with cognitive, affective, and behavioral aspects of the human-nature relationship. He described CP in relation to ecopsychology, and noted ecopsychology's focus on researching and understanding the *spiritual* connections humans have with non-human nature. He wrote that "if psychology and CP are concerned about environmental sustainability, they can no longer exclude the science of the soul, [and] spirituality" (Beringer 2003, p. 152).

However, in the first major CP textbook, "Conservation Psychology" by Clayton and Meyers (2009), Beringer and ecopsychology get only a passing mention. His argument has generally been ignored in CP's development as a discipline. Ecopsychology appears to be understood as contributing important ideas to ponder and perhaps address, but because of a lack of scientific objectivity, it is not considered central to psychology or an integral part of CP (Reser 1995; Clayton and Myers 2009). Therefore CP continues to place major emphasis only on understanding the cognitive, affective, and behavioral relationship with the non-human world from a scientific and empirical worldview. Spirituality, in this discipline, is not a major research focus.

Relevance for Thesis

CP gives this thesis the theoretical framework to study human attitudes vis-a-vis the non-human world, through studying environmental attitudes and behavior. The psychological models embedded in CP allow for the study and understanding of environmental attitudes from a quantitative, scientific standpoint. The cognitive, affective, and behavioral components of the human-nature relationship are all studied to better understand how humans view and experience the marine environment.

Because the majority of CP research is quantitative, i.e., large study groups, and surveys, various CP commentators have called for more 'qualitative research into the lived experience of human-nature relationships in order to further understanding of why nature is significant to people (Beringer 2003). Armed with these rich data, the researchers could strengthen their argument for conservation and the initiatives aimed at promoting conservation (Martin 2002; Beringer 2003; Clayton and Myers 2009). The data in this thesis are primarily qualitative and give a rich description of direct participant experience in and attitudes toward the ocean.

In order to more comprehensively understand the relationships between human awareness, spiritual connections and attitudes toward the ocean, I use a combination of ecopsychology and conservation psychology. Ecopsychology provides the theoretical framework for understanding spiritual and emotional connections, while CP provides the theoretical framework for studying the cognitive, affective, and behavioral components of environmental attitudes. The combination

of these two disciplines allows the development of a powerful lens to study direct experiences in nature.

2.3- Environmental Education

History of Environmental Education

Environmental education as it exists now has its roots in the outdoor education movement of the early part of the 20th century. Outdoor-based programs such as the Scouts and organized camping trips (school camps) began to grow in popularity (Hammerman 1980). However, it was the 1962 publication of Rachel Carson's *Silent Spring* that first brought international attention to the imperative for environmental education (Carson 2002; Stevenson 2007). This seminal book, which vividly and convincingly describes human impacts on nature, heralded the beginning of the modern environmental movement. Seven years later, in 1969, the first edition of the *Journal of Environmental Education* appeared. In an article entitled "The Concept of Environmental Education," William B. Stapp penned what is now recognized as one of the earliest definitions of environmental education:

> Environmental education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution. (Stapp 1969)(p. 30-31)

Over the years following the publication of *Silent Spring*, the field of environmental education began to take shape. In 1975, UNESCO organized the first International Conference on Environmental Education, which took place in Belgrade. The meeting's purpose was to follow up on the recommendation of the UN Conference on the Human Environment by creating a program of environmental education that could be used internationally. The result was the Belgrade Charter, which established objectives and principles for the program. According to the Charter, the goal of environmental education is:

> To develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones. (UNESCO 1977, p. 40)

The Belgrade Charter also recognized the need not only to establish a worldwide program that developed environmental education as an interdisciplinary field but also to encourage the program's integration into all levels of formal and informal education (Stepath 2006).

The next significant step in the evolution of environmental education as a discipline occurred in 1977 with the Tbilisi Declaration, which was formulated at first intergovernmental conference on environmental education. Held in Tbilisi, Georgia's capital city, this conference was organized by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) and the U.N. Environment Programme (UNEP). The declaration laid out "[the} role of environmental education in the preservation and improvement of the world's environment, as well as in the sound and balanced development of the world's communities."

The Tbilisi objectives are:

> *Awareness* – to help social groups and individuals acquire an awareness and sensitivity to the total environment and its applied problems;
> *Sensitivity* - to help social groups and individuals gain a variety of experiences in, and acquire a basic understanding of, the environment and its associated problems;
> *Attitudes* – to help social groups and individuals acquire a set of values and feelings of concern for the environment and motivation for activity participating in environmental improvement and protection;
> *Skills* – to help social groups and individuals acquire skills for identifying and solving environmental problems;
> *Participation* – to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems. (UNESCO 1978; Hungerford and Volk 1990; Stepath

2006).

Coupled with the Belgrade Charter, the Tbilisi Declaration allows practitioners to craft environmental education programs that comply with a uniform international standard and that reach for common educational outcomes (Kreis 2007). The objectives contained in these two documents have been used extensively over the past 30 years and to this day continue to guide the development of environmental education. However, there is ongoing critical review of the guidelines that is aimed at both assessing the effectiveness of environmental education and refining or changing guidelines as needed.

As currently defined, environmental education is an extremely broad topic, encompassing not only different fields of research but also diverse teaching techniques. Because of its complex nature and need to harness multiple ideas, perspectives and concepts, environmental education is, of necessity, interdisciplinary, holistic, and cross-curricular (Scott 2007).

In the context of this thesis, the definition that I will use for environmental education is adapted from the work of Harold R. Hungerford and Trudi L. Volk (Hungerford and Volk 1990). Commonly employed in the field (Plankis 2009), the definition is:

> That aspect of education that develops individuals who are environmentally knowledgeable and, above all, skilled and dedicated to working, individually and collectively, toward achieving and or maintaining a dynamic equilibrium between the quality of life and the quality of the environment (Hungerford and Volk 1990, p.258)

The guidelines for environmental education discussed above are broad, and many different ways of implementing conforming programs exist. The guidelines that relate most closely to the objectives of this thesis are discussed below.

Links to Sustainability

Environmental education is a subset of sustainability education. Sustainability is focused on understanding how humans can create and grow sustainable communities (Brown, Hanson et al. 1987)It is important to mention sustainability education in this thesis because sustainability is now a major worldwide goal (UNESCO 2005). In 2002 UNESCO launched the Decade of Education (DESD) for Sustainable Development, whose goal is achieving "respect for others and respect for the planet and what it provides us with (resources, fauna and flora)." This approach challenges many conventional educational practices by promoting:

> Interdisciplinary and holistic learning rather than subject-based learning;
> Values-based learning;
> Critical thinking rather than memorizing;
> Multi-method approaches: word, art, drama, debate, etc.;
> Participatory decision-making;
> Locally relevant information. (UNESCO 2005)

In response to the DESD, Australia has also launched sustainability education initiatives for schools and communities that have culminated recently in the release of the national sustainability curriculum framework (Government 2010). In line with the UNESCO DESD approach, researchers for the Australian approach suggest that education for sustainability should motivate and empower individuals and groups in creating a more sustainable world and that in order to further sustainability goals (Tilbury 1995).

Education for sustainably in Australia has evolved from being focused solely on increasing awareness of ecology and human impacts to employing community education initiatives to give people the knowledge and skills they need to live sustainably. Education for sustainability is now a main component of the national policy on the environment and sustainability (Australian Department of the Environment Water Heritage and the Arts 2009).

For practitioners, a general caveat is that sustainability can become too focused on initiatives emanating from government and industry (Fraser, Dougill et al. 2006). While such collaborations can be useful, they often do not sufficiently engage the local community. Care should be taken to ensure that education for

sustainability realizes its potential to energize and empower students and other citizens to make their own lives and their communities more sustainable.

Experiential Environmental Education

With the foundation of the theory and the importance of environmental education explained, this section now addresses how to properly implement experiential environmental education programs that use direct experience to teach people about their connections to the Earth and the impacts our species is having on the natural environment. The problem with using mainstream educational techniques for achieving these goals is that students receive instruction in a classroom or other indoor setting; the land's ability to teach us has been ignored (Kellert and Wilson 1995; Abram 1997; Abram 2011). This scenario denies the evolutionary impulse of connecting to land through experiencing the outdoor environment (Wilson 1984; Abram 2011). In order to help people connect to this impulse, teaching of EE should be in an outdoor setting (Kaplan and Talbolt 1983; Ford 1986; Bogner 1998; McLeod and Craig 2003; McLeod and Craig 2004; Handler and Duncan 2006; Stepath 2007; Payne and Wattchow 2008; Cormode 2009).

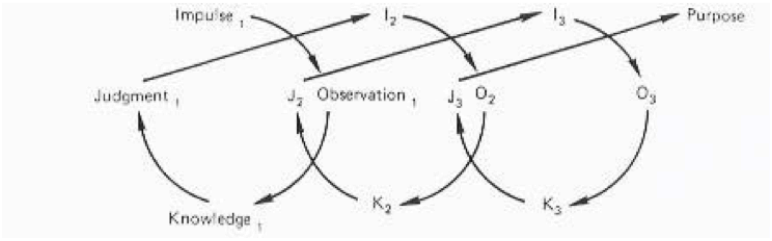
The Roles of Experiential and Transformative Learning

> [A] nd so we focus on what seems to be the area of deficiency, namely experience. We put together 'experiential education', as though education could have ever been anything else. The irony is that we do indeed seem to have invented a non- experiential sort of education, not by design so much as due to the fact that our whole culture has drifted strongly in a schizoid direction. We have retreated over a period of several centuries from feelings and relationships into individualization and abstract thinking. We are living to an extraordinary degree in our heads rather than our emotions. When experiences get too chaotic, we try to control it by force or manipulation, or we retreat from dealing with it into thinking about it. (Fox 1995, p. 99)

Experiential learning is an educational methodology that posits learning as a process in which understanding is created through the transformative power of participatory experience (Kolb 1984; Davis and Stocker 2006; Down 2006; Netherwood, Stocker et al. 2006; Wooltorton 2006). Experiential learning includes an action that creates an experience, reflection on the action and experience, abstractions drawn from the reflection, and application of the abstraction to a new experience or action (Stehno 1986). This process-based learning is in contrast to techniques that are reductionist and require memorization and recital of facts.

John Dewey's seminal work on the need for experiential education in formal curricula was published in 1938. In *Experience and Education*, Dewey laid out his philosophy of education, which was also a direct critique of a school system that placed too much importance on acquiring knowledge through texts rather than through experience (Dewey 1938; Kolb 1984). Following Dewey such prominent educators and psychologists as Kurt Lewin and Jean Piaget played a large role in developing the field of experiential education (Kolb 1984).

Dewey, Lewin, and Piaget also contributed influential models for experiential learning. The theme of all these models is that learning is "best conceived as a process, not in terms of learning outcomes" (Kolb 1984). Learning occurs; then relearning occurs from a different perspective; things are forgotten then learned again in a new way. This learning is a continuous process that is grounded in experience.



Dewey's Experiential Learning Model (From Kolb, 1984)

Experiential learning uses critical thinking, problem solving, and inquiry, rather than memorization (Kolb 1984). *Experiential learning: experience as the source of learning and development* (Kolb, 1984) contains an excellent review of Dewey's, Lewin's, and Piaget's experiential learning models. The more traditional cognitive and rationalist learning uses acquisition, manipulation, and recall of

abstract symbols and tends to leave subjective experience and consciousness out of the learning model (Kolb 1984).

In this thesis, experiential learning is applied to outdoor marine environmental education. Students will "experience" a marine environment, take photos of and make observations about that environment, and then share their photos and observations with the class. This learning is process-based and cyclical because students will re-visit the marine environment multiple times (at least 2 fieldtrips for most of the schools), making different observations, taking different pictures, and refining their photographic technique.

Outdoor Experiential Education

In order to feel connected to the natural world, people must have contact and experiences outside the human constructed reality (Bogner 1998; Loeffler 2004; Payne and Wattchow 2008). Unfortunately, most people in the industrialized world spend approximately 95% of their time inside (Louv 2008). As we move quickly from one indoor space to another, we cannot adequately process fleeting impressions of the crispness of the autumn air, the softness of the rain, or the gentleness of a summer breeze. By studying the effects of outdoor experiences on participants, we are able to design programs that are highly engaging and that foster "spiritual connections, connections to others, and connections to self" (Loeffler 2004).

Outdoor experiential environmental education, which is "in, about, and for the outdoors" (Ford 1986), is an antidote for this lack of connection. This method of teaching is often most/ effective at engaging students because they are physically involved in the environments that they are studying (Stepath 2006; Ashurst 2008). Experiences include, for example, researching local ecology through field-based studies, learning about the environment and culture through place-based studies, and engaging in scientific monitoring programs (Bogner 1998; Stepath 2006; Ashurst 2008; Cormode 2009; Bartlett 2011). As John Dewey has written: "Experience [outside the school] has its geographical aspect, its artistic and its literary, its scientific and its historical sides. All studies arise from aspects of the one earth and the one life lived upon it" (Dewey 1967) p. 91 Experiential education has been used extensively within environmental education and outdoor education research (Bogner

1998; Adkins and Simmons 2002; Stepath 2004; Brody 2005; Davis and Stocker 2006; Netherwood, Stocker et al. 2006; Stepath 2006; Wooltorton 2006; Stepath 2007; Zeppel 2008).

This kind of education should be targeted especially towards younger people, who are forming their values and worldviews (Kellert 1985; Eagles 1999; Scott 2007; Ashurst 2008; Louv 2008; Stern 2009). Richard Louv, the author of Last Child In The Woods, has explained why young people should have nature experiences:

> [A] n increasing number of parents – and a few good schools – are realizing the importance and the magic of providing hands-on, intimate contact between children and nature...Many of us are already acutely aware of our own disconnection to nature, amplified in our children, and the need to reweave that connection...Around the country, schools and museums are stepping up their efforts to connect children with nature. (Louv 1996, p. 14)

One critique of outdoor education arises from the fact that many programs have their roots in adventure activities such as climbing, rafting/kayaking, and fast-paced hiking (Ford 1986). These activities are often classified by the skill levels required to complete them—for instance, novice, intermediate, and advanced. Such classifications tend to focus participants on their performance rather than on their surroundings. The result is that sometimes participants are not fully present in the environment. For example, when people bushwalk in an organized group, they often break down the outing into the length of the hike and the changes in elevation. Concentration on these data takes people away from the pure experience of their surroundings and encourages the feeling of passing through rather than pausing or dwelling in a natural space. Participants have a goal and a plan to reach the goal. All other experiences are secondary to the completion of the mission (Payne and Wattchow 2008). There is nothing inherently wrong with this process, as it is effective at getting groups of people outdoors, however I believe outdoor education should be about achieving a balance between "fast learning" and "slow learning".

"Fast learning" is the dominant way in which we learn in 21st Century society (Payne and Wattchow 2008). In schools students are encouraged to learn by

memorizing as many facts as they can, and then they are assessed by use of standardized tests. As an alternative to this approach, Phillip Payne and Brian Wattchow, advocate a slow pedagogy for understanding humanity's place in nature.

> Long, long ago, time was 'slow' and experienced through natural bodily processes, the cycle of day and night, the ebb and flow of tides, the movement of the stars, seasonal changes and numerous other rhythms of nature, both human and more-than-human. Relations to ourselves, others and natural places, are often now experienced through layers of abstraction, particularly through digital technologies. The immediate, the sensual and the tangible are under siege by the remote, the disembodied and the abstract experience of the world. (Payne and Wattchow 2008)

Students should be allowed the time to re-align themselves to the rhythms of nature—something that is imperative if they are to re-connect their bodies to the rest of the living world. Experiential environmental education should utilize slow pedagogy whenever possible. Instead of making goals, we should foster activities that heighten participants' awareness of the present moment, in whatever environment they are actively a part of.

School-Based Environmental Education

School curricula, which have traditionally been discipline-based, are designed to place importance on understanding the abstract and theoretical (Stevenson 2007). Designed to teach facts about these topics that can be easily assessed, these curricula are increasingly measured by standards. In contrast, environmental education, which focuses on actual, tangible problems faced by the world, tends to use experience-based rather than traditional classroom learning (McLeod and Craig 2004; Stevenson 2007; Ashurst 2008; Fodrowski 2008).

Many studies have been undertaken to assess the effectiveness of the school-based environmental education programs that have been implemented worldwide (Fortner and Teates 1980; Fortner and Mayer 1983; Flint 1991; Bradley 1999; Hart and Nolan 1999; Rickinson 2001; McLeod and Craig 2004; Johnson and Manoli

2008) In 1999, Paul Hart and Kathleen Nolan published a comprehensive review of this research (Hart and Nolan 1999). Because of the great number of these studies, this section of my thesis is limited to an overview of a few that are key.

Aimed at encouraging a change in attitudes and behavior, many of these programs sought to increase awareness through direct experience in the environment. Although these programs were successful in achieving this goal, their effect was short-lived. Many of the relevant studies reviewed by Hart and Nolan found that only a weak connection exists between increased awareness and subsequent responsible environmental actions (Hart and Nolan 1999).

Moreover**,** Kim Walker and Tony Loughland (2003) have found that despite the fact that researchers have a good theoretical understanding of what environmental education in schools should entail, they have little knowledge about children's environmental understanding (Walker and Loughland 2003). The challenge now for researchers is both to understand how children perceive the environment and to ascertain how educators can best engage young people in learning about the natural world.

In Australia:

In recent years, the number of Australian environmental education programs has grown; however, they continue to suffer not only from a lack of funding but also from marginalization within the curriculum (Walker and Loughland 2003). In order to overcome at least the latter obstacle, environmental education should be integrated holistically into the standard curriculum: It should be a cross-curricular, on-going topic taught throughout the school year (Smith 1993; Gough 1997).

In Australia, environmental education is often subsumed under the broader category of sustainability. In 2001, the country implemented the Australian Sustainable Schools Initiative (AuSSI), which establishes standards for the development of a culture of sustainability in schools. These standards call for

- Facilitating the use of environmentally friendly technologies to minimize a school's energy, waste and water usage;
- Leading to new management strategies for school grounds that conserve biodiversity;

- Integrating sustainability into curricula through generating better engagement with existing EE and EfS [Education for Sustainability] approaches, resources and products. (Davis and Ferreira 2009)

AuSSI has been successfully implemented in more than 3000 Australian schools—30% of the total number in the country (Government 2012). All over Australia, students are learning about gardening organically and curtailing carbon/water consumption as important steps in the establishment of a sustainable society (HotRock 2012).

In summary, while implementing large government programs such as AuSSI is a positive step toward sustainability in Australia, I believe that environmental education must retain one of its basic tenets—education about the outdoors, in the outdoors.

Environmental Adult Education (EAE)

Engaging adults in environmental education is equally as important as engaging youth. (Emmelin 1976; Finger 1989; Sumner 2003; Haugen 2010). Adult environmental education (AEE) *"*combines environmental education and adult learning theory to provide meaningful educative experiences to learners with the purpose of bringing about genuine environmental change.*"* (Haugen 2010)

In 1976, Lars Emmelin published the first peer-reviewed article calling for EAE (Emmelin 1976). Entitled "The Need for Environmental Education for Adults," this article discussed the two contemporary vectors of environmental education—the media and direct action—and compared and contrasted their effectiveness. In addition Emmelin argued that, in order to be effective, adult environmental education needs both formal and non-formal settings.

Matthias Finger called for EAE to be transformative, a concept that he defined as "a total phenomenon including cognitive, emotional, as well as action dimensions" (Finger 1989 p. 27). According to him, ecological knowledge alone does not result in transformation (Finger 1989). Thus EAE must not only address lack of awareness but also help empower individuals to transform themselves

(Clover, Jayme et al. 2000; Clover 2000; Kovan and Dirkx 2003). As explained subsequently by Karen Yarmol-Franko, with transformative EAE:

> [W] e are reminded that the key to achieving sustainable development is the transformation in the way we think and live, both individually and collectively. We must break habits and throw away norms as the environment becomes a running theme throughout our lives. Environmental adult education works to achieve this transformation. (Yarmol-Franko 1989, p.4)

Jessica Kovan and John Dirkx argue that transformative education must have a *"*spiritual dimension*."* This type of engagement helps adult learners both to process what they have learned and to put meaning to their new knowledge (Kovan and Dirkx 2003). The authors hypothesize that the results are likely to lead to positive emotional growth as opposed to negative emotional development such as feelings of hopelessness and disempowerment that often stem from knowledge of environmental degradation.

Because of its effectiveness as a learning tool, experiential education is also an important component of EAE (Wittmer and Johnson 2000). In 2000, Carrie Wittmer and Brian Johnson developed and wrote about a new model of experiential education for adults that they tested with the Audobon Expedition Institute. Their model is based on the work of David Kolb (1984), whose construction comprised preparation, direct experience with the object of learning, reflection, and transformation (Wittmer and Johnson 2000).

EAE In Australia

The goals of adult environmental education are laid out in the Australian Government's National Action Plan for Sustainability (2009).

> The Australian Government recognizes the current heightened community awareness of issues such as climate change and water shortages and

> Australians' willingness to help meet the significant sustainability challenges we face. To tap into this spirit to act, the community must be empowered with knowledge, skills and opportunity. (Australian Department of the Environment Water Heritage and the Arts 2009, p.26)

The government, which agrees that EE must be transformative, acknowledges the need to support community environmental educators by ensuring that they have the proper knowledge and tools (Australian Department of the Environment Water Heritage and the Arts 2009). Government researchers are also working to understand community attitudes, values, and behavior vis-à-vis the environment.

Two important community (adult) environmental education programs now running in Australia are:

Marine Parks Education

The Australian government has undertaken several large-scale environmental education programs in conjunction with conservation efforts aimed at increasing public awareness of marine protected areas. A prime example of these efforts is the public education component of the Great Barrier Reef Marine Park Authority. The authority uses displays on site, TV, radio, and newspaper educational programs/segments, and talks to local organizations to educate about the reef environment, human impacts and proper human interaction (Alder 1996).

However, education alone was not fully effective in management of the reef. Enforcement activities were also found to be necessary. In order to ascertain which method (education or enforcement) was more successful at reef protection, Jackie Alder assessed education programs against enforcement alone (Alder 1996). Her conclusion was that both methods are important and that one could not replace the other. At the time of the writing of this thesis, the Australian Federal Department of Sustainability, Environment, Water, Population and Communities is working to establish marine parks in all federal waters (Government 2012).

Living Smart Courses

The low-cost Living Smart Courses are run by a partnership of councils, universities, and the local communities. They are designed to "show participants what sustainability means in the context of their lifestyle and their community, as well as demonstrate how they can take action to contribute to sustainability within their own local community" (Sheehy, Jennings et al. 2004). Each course covers a range of sustainability topics through a combination of presentations, workshops, goal setting, and field trips led by a trained course facilitator. Topics covered include transport and waste management, biodiversity, water conservation, and organic gardening. The goal of the program is to teach participants to make sustainable choices in their lives and to empower them to "embrace a connected approach to living" so that the effect of environmentally positive decisions that they make now can last long into the future (Smart 2012).

Sheehy and Jennings et al. found that after participating in the first pilot study, 95% of the participants felt more connected to their community, and 80% felt as if their wellbeing had been enhanced. The review concluded that community environmental education/sustainability programs have an important role to play in achieving sustainable living (Sheehy, Jennings et al. 2004).

Experiential marine education could be integrated into education initiatives such as Living Smart courses. Coastal communities have strong linkages to the ocean, and these courses could link the land and sea by incorporating experiential marine education programs. Snorkeling excursions to local beaches could foster a sense of community among the participants and a sense of connectedness to the marine environment.

Relevance for Thesis

This thesis describes and assesses underwater photoelicitation, a new experiential marine education technique. Marine education is a subset of environmental education, therefore, before marine education can be discussed, a review of environmental education must be given. Environmental education is the broadest field that the research fits into.

2.4- Marine Education

A Call for Ocean Literacy and Marine Citizenship

Before there can be a discussion of the history and current state of marine education, there must be an examination of the curriculum's overarching goals. Recently, two major themes have emerged in the relevant literature. During the early to mid-2000s, the development of an ocean literate population was the standard for marine educators. Subsequently the idea of ocean citizenship began appearing in the literature. The goal of these related, complementary concepts is the creation of an aware, politically savvy, and active citizenry that appreciates ocean sustainability and understands other environmental issues. Both concepts are explained in more detail below.

Ocean Literacy

In 2005, members of the National Marine Educators Association and the Centers for Ocean Sciences Education and Excellence came together with educators, government professionals, scientists, and other interested parties to define what is meant by ocean literacy (Greely 2008; Plankis and Marrero 2010). They ultimately agreed on a definition that is based on the concept of scientific literacy: Ocean literacy is the "ability to make informed decisions regarding scientific issues of particular social importance." (American Association for the Advancement of Science 1993; National Research Council 2006; Greely 2008). Moreover, an ocean literate person can "communicate about the ocean, understand the science of the ocean and make informed decisions about ocean policy." (COSEE 2005; Schroedinger, Cava et al. 2005; Greely 2008). More concisely the National Geographic Society has defined ocean literacy as "an understanding of the ocean's influence on you, and your influence on the ocean." (National Geographic Society 2006)

Subsequently, the Ocean Literacy Network described the seven principles of ocean awareness:

1) Earth has one big ocean with many features;
2) The ocean and life in the ocean shape the features of Earth;
3) The ocean is a major influence on weather and climate;
4) The ocean makes Earth habitable;
5) The ocean supports a great diversity of life and ecosystems;
6) The ocean and humans are inextricably linked; and
7) The ocean is largely unexplored (Ocean Literacy Network 2008, p. 1-2).

Ocean literacy takes into account both the social and the scientific aspects of humanity's relationship to the ocean. The former comprises issues surrounding the human impact on the ocean, the ways that nations govern the oceans, and the need to achieve sustainability. The latter comprises issues surrounding the understanding of how the ocean works and how the ocean is studied (McKinley 2010). Because our relationship with the ocean is complex, interaction between these aspects is important for developing ocean literacy.

The studies undertaken to assess public ocean literacy, many done in the United States, show that although adults express concern about the ocean, they have limited knowledge about how the ocean works or how we are affecting it (Belden and Stewart 1999; American Association for the Advancement of Science 2004; Steel, Smith et al. 2005). For example, a 2005 random national sample of 1233 citizens found that while coastal residents are slightly more knowledgeable, both coastal and non-coastal residents have low levels of ocean-based knowledge. The study's major finding was that, even given media coverage of the issues, without first-hand experience of the ocean environment, people would be unlikely to change their attitudes toward the ocean and its human-caused problems (Smith et al. 2005).

Brian Plankis and Meghan Marrero summarize the results of two recent case studies examining the ocean literacy of American students. They found that these students had:

1) Initial interest but low knowledge levels about the ocean;

2) Low awareness of the urgency of ocean issues; and

3) Interest in behavior changes aimed at protecting the ocean (Marrero 2009; Plankis 2009; Plankis and Marrero 2010).

These findings, which mirror the results of studies of adult populations, show similarity between students of coastal and non-coastal states and demonstrate that proximity to the ocean does not necessarily positively correlate with ocean literacy. Although most students could not explain their connection to the ocean or the ocean's effect on their lives, both case studies found that engaging students in an ocean literacy program did increase their awareness. Plankis and Marrero call for more long-term research that focuses on increasing ocean literacy within the student population (Plankis and Marrero 2010).

With programs such as Marine Activities, Resources & Education (MARE), educators are reaching out to classrooms worldwide. Run by the Lawrence Hall of Science in Berkeley, California, MARE seeks to increase literacy in ocean sciences through formal and informal educational initiatives. This effort includes:

- Ocean sciences curricula;
- College courses;
- Professional development and assistance;
- MARE in schools;
- Ocean Literacy Campaigns;
- Youth programs; and
- Partnerships with other institutions (MARE 2012).

Marine Citizenship

Marine citizens are individuals who are motivated to change their personal behavior and lessen their impact on the marine environment (Fletcher 2007; McKinley 2010). The concept of marine citizenship is based on the model of environmental citizenship, which had been created by Environment Canada to be "a personal commitment to learning more about the environment and to taking more responsible environmental action" (MacGregor and Szerszynski 2003). Marine citizenship can be seen as the rights and responsibilities of a concerned and informed

individual (both of individual and collective impacts) towards the marine environment (McKinley 2010).

Ocean literacy and marine citizenship are similar in the definitions that they use and the framework that they establish for educating and empowering individuals. Marine citizenship compliments ocean literacy by recognizing the need for individuals to be empowered within their system of government so that they feel that they can affect the molding and creation of ocean-based policy. To be effective, a citizen must be both informed and active. Citizens should "take greater personal responsibility for the oceans, as a policy channel to support the delivery of a healthy marine environment and to enhance marine governance" (McKinley 2012, p. 839). An individual with a developed sense of marine citizenship will be an active member of society, making educated input into decisions about marine policy—for example, where to establish marine parks, whether to use plastics, and whether to consume seafood.

However, in the real world, creating an ocean literate population or a competent marine citizenry is a multi-faceted and complex challenge. Each of the world's different nations has it own level of affluence and education and its own school systems. These two relatively new concepts have been studied only in the First World, especially in the US and Great Britain. Apparently no study has been undertaken in Australia to specifically test ocean literacy or marine citizenship. Instead, studies have focused on the population's knowledge, attitudes, values, and beliefs regarding the ocean and its use by humans. Understanding how to promote ocean literacy and marine citizenship in Australia is important because the vast majority of Australia's population is coastal dwellers and the sea is highly significant in the Australian lifestyle.

Marine citizenship calls for citizens who are aware of the marine environment. This research links into marine citizenship because one of the main goals is to assess whether direct experience in and photography of the marine environment, increases awareness. Further research could be undertaken to assess which educational tools are best to increase awareness of the ocean in relation to marine citizenship.

A Call for Marine Education

Education about marine science and sustainability is the best way in which to produce citizens who are ocean literate, and many studies have called for improving and expanding marine education in order to grow awareness (Steel, Smith et al. 2005; Fletcher 2007; McKinley 2010; Plankis and Marrero 2010; McKinley 2012).

There are many articles regarding marine education that fail to mention ocean literacy or marine citizenship. This could be because these terms have been coined fairly recently, and it appears as if more current papers are linking their research back to these core concepts. I feel it is useful to link future marine education research with core concepts such as ocean literacy and marine citizenship, as these help the field of marine education define itself and provide a framework of common goals for researchers and educators to work toward.

It is also important for marine education to engage students' emotional and experiential connections to the ocean (Stepath 2006; Zeppel 2008; Spitzer and Anderson 2011). I believe we must allow students to gain a sense of connection by experiencing not only the vastness and the power of the ocean but also its fragility and the extent to which humans have damaged the marine environment. In my opinion, only when armed with that duality and sense of perspective, can students take what they learn (knowledge) to heart.

Definition of Marine Education

An extremely broad concept, marine education encompasses all matters touching the ocean environment. Along with other aspects of environmental education, the concept was first integrated into Australian and US formal education systems in the late 1970s and early 1980s (Fortner an Mayer 1991; Moffat 1997). At that time, researchers began to assess people's baseline knowledge about ocean and aquatic issues and to test the effect of marine education on this knowledge (Fortner and Teates 1980; Fortner and Mayer 1983; Moffat 1997).

Although scholars have defined and interpreted marine education in various ways, this thesis will use the definition used by Carl Stepath (Stepath 2006).

Marine education is:

> That part of the total educational process that enables people to develop sensitivity to and a general understanding of the role of the seas in human affairs and the impact of society on the marine and aquatic environments. Marine education refers to education that relates to the ocean, coastal waters and human relations to these environments. (Stepath 2006, p. 47)

School-based marine education can happen in the classroom drawing on traditional learning techniques, classroom visits from experts in the field, digital learning methods, visits to aquariums/science centers, and fieldtrips to the ocean itself (Fortner 1985; Zicus 2003; Winn, Stahr et al. 2006; Scott 2007; Ashurst 2008). With the general public, aquariums and on-site interpretation at marine protected areas play a pivotal role in engagement and education about marine issues and human impacts (Falk, Reinhard et al. 2007).

In reviewing their effectiveness, David Wortman and Dristina Cooke found that most coastal management education programs focus on the mere provision of information about our coast. However, according to these commentators, a more effective way of teaching is to give participants the opportunity to discuss and reflect on issues (Wortman, Cooke et al. 2006). Integrating more coastal and marine education programs into schools, and offering them to the wider community, will be critical for progressing toward marine sustainability. Anyone organizing such programs would be wise to consider Wortman and Cooke's findings.

Need for Experiential Marine Education

Experiential marine education (EME) involves persuading people to interact with the ocean. Stepath provides an excellent summary of the state of marine experiential education and explains how people learn and change after interacting with the ocean. He posits that marine experiential education may have the potential to transform how people feel, think, and behave in relation to the ocean. Unfortunately, in the 30 years since Fortner and Mayer discussed ways in which marine experiential education can fit into a curriculum, little formal research has been done on the implementation of experiential marine education in school settings

(Fortner 1978; Fortner and Mayer 1983; Stepath 2006; Ashurst 2008).

However, there is an increasing amount of literature showing the benefits of marine education that takes place in and around the ocean (Kahn 2001; Stepath 2006; Ashurst 2008). The experiences that students have while directly engaged with outdoor environments are critical to their remembering what they have learned and the context to which that knowledge pertains (Stevens and Richards 1992; Stepath 2006).

A Few Key Case Studies

In 1986, Gloria Snivley published one of the earliest commentaries on a school-based experiential marine education program (Snively 1986)**.** Snivley studied the reactions of 6th graders to the ocean through the prism of an experiential marine education program consisting of fieldtrips to the beach and lessons focusing on ecological seashore relationships. She used the term *orientation* to describe students' beliefs and underlying values, their personal interpretation of the marine environment, and the ways in which they communicated their knowledge. Snively set out to explore the relationships between students' attitudes and beliefs of the seashore and their experiences during science instruction. Through her interview-based analysis, she found that students used utilitarian, aesthetic, scientific, spiritual, recreational, and health and safety orientations toward the marine environment and that some students held internally inconsistent beliefs. She discovered that students' overall knowledge had increased after participating in the experiential program and that any prior inconsistent beliefs had decreased in their expression (Snively 1986).

As the research in this field progressed, more emphasis was placed on assessing the effectiveness of experiential marine educational programs, with most studies adopting the cognitive, affective, behavioral model or variations thereof. Snively and Cummins studied the impacts of a constructivist, experiential-based marine education program on 4th graders in Vancouver, British Columbia (Cummins and Snively 2000). The program consisted of hands-on learning activities in the classroom and field trips to local beaches and a local marine ecology center. The researchers assessed students' knowledge, attitudes, and opinions toward marine resource issues before and after the program. Attitudes were labeled as positive or

negative regarding a host of marine issues. Opinions were classed as preservationist, conservationist, and exploitive. Research questions were assessed through the use of pre- and post-test questionnaires (Cummins and Snively 2000).

Results from the eight-week study showed a marked gain in knowledge and an increase in positive attitudes toward the marine environment. However, the results did not reveal a significant relationship between the two factors. Instead the authors assert that the main causation for the changes was the direct experiences that the students had with the ocean. "For example, many children had not realized that barnacles and aggregate anemones were actual living animals until their field experiences" (Cummins and Snively 2000, p. 321). The value that the students began attaching to marine plants and animals became apparent to the educators. After repeated visits, the students' response to the oceans became even more dramatic:

> The final trip to Saxe Pt. presented a far different picture than the first. Instead of throwing rocks into the water and having to be reminded to keep on task, the children were engaged in self-directed observation activities, excited about what they saw, and respectful of the plants and animals they had come to know. The suggestion by some students to return for a beach cleanup was later acted upon in the spring. (Cummins and Snively 2000, p. 323)

Carl Stepath has looked at the effect that implementing an experiential marine education program had on Queensland high school students who were studying the oceans. He analyzed changes in students' environmental knowledge (awareness), attitudes, and ecological intention to act on coral reef conservation after they had visited the Great Barrier Reef. He tested two variables—a presentation about the reef and direct experience on the reef, in a population that comprised students from five schools. The students were divided into four groups, ones that got the presentation but no field trip, ones that went on the field trip but got no presentation, ones that got both, and ones that were part of a control group. Using this method, Stepath could isolate the experiential aspect of the educational experience and see if it was effective in changing students' knowledge, attitudes, and ecological actions. He used a mixed methods approach, combining interviews and surveys to collect data.

Stepath found that that, on the one hand, knowledge alone did not correlate

with a change in attitudes but that, on the other, all experiential education had a positive effect on students' environmental knowledge, attitudes toward reef environments, and stated intentions to act. This finding was different from his original hypothesis, which was that the combination of a presentation and reef experience would lead to the most change in all three variables—knowledge, attitudes, and action. Group 1, which received the presentation without reef experience, had the most change in knowledge but less change in attitudes and action (behavior). Group 2, which received the reef monitoring field trip only, had the greatest change in environmental attitudes and intention to act but less change in knowledge (Stepath 2006; Stepath 2007).

In addition Stepath found a significant positive correlation between the reef experience that students had prior to his program and their knowledge and ecological intention to act for reef conservation (behavior) (Stepath 2006). All these findings support the claim that experiential marine education builds connections with and to marine environments. Of course traditional educational programs usually focus on knowledge as the first step in empowerment (Stepath and Whitehouse 2006; Stepath 2007). In addition, the work of Stepath and others demonstrates that for educational programs to be successful, experience must generally come before knowledge.

Because many marine education programs are run from marine centers, student participants are able to interact physically with the marine environment. Research demonstrates that these centers are quite effective at both engaging visitors and shifting their attitudes temporarily. However, unfortunately, soon after the experience, most people's newly developed pro-environmental attitudes regress to pre-visit status, and the development of long-term behavior incorporating more sustainable actions is rare (Adelman, Falk et al. 2000).

Marine Education in Western Australia

Australian marine studies began during the mid-1970s, when the Schools Commission offered a grant that helped to purchase a sailing ship that could be used for training, and to establish an expedition boat shed (the first of its kind in Australia). In their marine studies classes, students were taught ship building and sea trekking (Moffat 1997).

The late 1970s and early 1980s saw the introduction of the Secondary Transition Education Project (STEP). Under its auspices, the marine studies program was expanded to include:

> Students working in boats getting speed boat drivers licenses at school, snorkeling and SCUBA courses as part of main stream curriculum, commercial radio licenses being issued to high school students from TAFE programs, TAFE teachers teaching in high schools and students going to TAFE in school time, conservation management activities and excursions to new marine parks, coastal studies of local sand movement patterns, students working on water quality of local coastlines, students going to field study centers for day or overnight programs, fishing and fisheries technology as part of the curriculum, students learning how to repair outboard motors, classroom navigation and links with TAFE. (Moffat 1997, p. 195)

In his 1997 review of Australian marine education, Bob Moffat discusses the marine studies programs at Western Australia's South Fremantle and Broome High Schools (Moffat 1997). When Moffatt published his review, South Fremantle was a national leader in marine studies. Its proximity to both the ocean and a fleet of available boats makes it ideal for such a curriculum. Since the late 90's, an eclectic mix of relevant courses has been available to students and a variety of experiential marine learning activities are on offer. In addition students can participate in annual excursions to Ningaloo Reef. South Fremantle SHS was one of the five schools to take part in Show Us Your Ocean!. South Fremantle offers SCUBA and snorkeling certification (Moffat 1997).

Broome High School was a leader in marine studies, although they no longer have an active marine studies program. The year 11 and 12 classes studied first aid, oceanography, marine management, marine biology, pollution and water quality monitoring, meteorology, maritime history, and marine archeology. The students also enjoyed a strong experiential component to their studies—for example, they took excursions to local sites and study impacts of local industry (Moffat 1997).

Since 1997, Western Australia has seen a boom in online curriculum resources for marine studies. For example, Marine WATERS (Western Australian Teacher Education Resources) is:

> An interactive and fully integrated resource that connects educators and students with resources and tools developed specifically to study Western Australia's unique marine ecosystems and address challenges facing the sustainability of our aquatic resources. (Department of Fisheries 2012) Marine WATERS website

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The Marine WATERS website includes interactive activities, student worksheets, information on current and emerging issues, extension activities and lesson plans. The program focuses on fostering and developing students' knowledge, awareness, attitudes, and skills vis-a-vis marine sustainability. Because Woodside Petroleum through the Department of Fisheries funds the WATERS project, ample money is available for development of sleek, glossy curricular materials. Online subjects include processes (physical and biological), marine biology (marine species diversity), habitat (structural features), humans and the marine environment, and marine management. These materials comply with the WA and Australia-wide curriculum goals, teachers are able to adapt them as they see fit. The strength of these resources lies in the fact that they involve local marine ecosystems; students are able to learn about the areas that they live and play in, thus developing a more informed sense of place. Other online resources are more general, and having is a marine curriculum based on WA marine ecosystems is extremely beneficial for WA schools (Waters 2012).

There is also now a countrywide organization that supports marine educators called the Marine Education Society of Australasia (MESA). MESA provides materials and helps train educators, helps network and train educators, develops community understanding of marine issues, and encourages contribution towards marine education initiatives (MESA 2012).

Marine education in WA also benefits from marine education centers. For example, the Aquarium of Western Australia, which has a large marine education component, reaches out to many different schools and organizations (AQUA 2012). The Bunbury Dolphin Discovery Center has an interpretive center and runs excursions involving direct interaction with the local dolphin population (BDDC 2012). There has also been a call for a marine education "eco-camp" south of Perth that would include more immersive marine components (La Mar 2006).

Relevance for Thesis

The thesis is nested within the field of marine education. This section described the history of the field and how this study fits into marine education. This thesis contributes directly to the field by adding a new technique for experiential marine education, underwater photoelicitation.

2.5- Photoelicitation

History of Photoelicitation as a Research Method

First described by John Collier, Jr. in the *American Anthropologist* in 1957, photoelicitation is a qualitative methodology for research. It comprises an interview with a participant about photographic material that has been collected by the interviewer or collected by the participant (Collier 1957; Collier 1967; Harper 1986; Collier 1987; Ibanez 2004). Collier was a faculty member at Cornell University and part of a research team studying mental health in communities that were changing because of immigration or employment prospects. He and his team were assessing psychological stress within families who lived in ethnically diverse communities and worked in new types of urban factories. Because the researchers were having a difficult time getting data from traditional interviews Collier decided to use a photo survey depicting images of the old and new worlds inhabited by the residents. Collier found that using these photos resulted in a much more focused and in-depth discussion and elicited more emotional responses than did the traditional interview method. Non-photographic based interviews depended more on the mood of the interviewee and tended to be much less focused.

Collier also found that:

> Photographs can be stimulating and can help to overcome the fatigue and repetition often encountered in verbal interviews. It is also safe to assume that the photographs were an aid to rapport in opening the field of discussion, whereas in the control interviews we sometimes had to press against resistance and apathy. (Collier, 1957:857)

Ten years later Collier published *Visual Anthropology: Photography as a Research Method* (Collier 1967). Updated in 1986 (Collier and Collier 1986), this work became the standard introduction for practitioners in visual anthropology and sociology. The book not only included his previous work and other studies that had been done in the field but also expanded the applications of photoelicitation. Collier and his son Malcolm wrote that the amount and scope of data is more than the simply the subject of the photograph itself and that photographs empower the participant instead of than the researcher to drive the interview. Further, the Colliers found that participants relaxed more when photographs rather than they themselves were the subject. In 1987, Collier published another article about photoelicitation in the inaugural issue of *Visual Anthropology* (Collier 1987).

Photoelicitation can be very beneficial in evoking deeper emotions from a participant than can a words-alone interview (Harper, 2002). As Douglas Harper explains, a physical basis exists for this reaction. During our evolution as a species, we humans developed our faculty of sight before we developed our faculty of speech. Therefore, viewing images perhaps accesses deeper levels of human consciousness than verbal communication (Harper 2002; Myers 2006). As generations of marketers have known, a picture is, indeed, worth a thousand words.

In his excellent 2002 review of the history of photoelicitation, Harper points out that although Collier published within anthropology, the majority of subsequent photoelicitation research and publication has fallen within the realm of visual sociology. In fact, photography is one of four main research methodologies discussed in *Perceiving a Planned Community,* the first major text to describe visual sociology (Wagner 1978). Harper also describes other significant studies that use photoelicitation as their main methodology (Dempsey and Tucker 1994; Clark 1999; Smith and Woodward 1999; Sampson-Cordle 2001). In considering these studies, Harper writes that photoelicitation "demonstrated the polysemic quality of the image; it thrust *images* into the center of a research agenda; it demonstrated the usefulness of images ranging from fine-arts quality to documentary family snapshots" (Harper 2002)

Four main areas of research emerge from Harper's meta-analysis of photoelicitation:

- Social class/social organization/family;

- Community/historical ethnography;
- Identity/biography/autobiography;
- Culture/cultural studies.

For more detail on studies within these categories, please refer to *Talking about pictures: A case for photo elicitation* (Harper 2002).

From Harper's review, it is apparent that photoelicitation is used mostly in ethnography in order to elicit people's stories about their lives and to focus on particular aspects of the human experience. By 2002, very little had been published about this methodology's use to study human connection to place or non-human environment. However, since then, a few studies have appeared that use photoelicitation to explore this topic (Loeffler 2004; Loeffler 2004; Beilin 2005; Miles and Kaplan 2005; Garrod 2008; Bignante 2010).

Two Methods of Photoelicitation

There are two major forms of photoelicitation and multiple uses for each. With the first, which is researcher-driven, participants discuss photographs that the researcher has complied him/herself. Planners for land-use scenarios often use this method in the form of visual preference surveys (Nelessen 1994; Campbell 2006; Crisman 2006). Residents are shown photographs of the affected urban landscape, and computer-generated images of proposed changes are superimposed to elicit the attitudes and preferences of residents. Although useful for some applications, this method is a fairly top-down approach that limits the freedom of the participants to frame the research (Stewart and Floyd 2004; Crisman 2006; Auken, Paul et al. 2010).

With the second method, which is participant-driven, the participants take pictures themselves and discuss these pictures with the researcher. Many applications are available to researchers using this method. These include: auto-driven photoelicitation/participant-driven photoelicitation (Loeffler 2004; Loeffler 2004; Beilin 2005; Miles and Kaplan 2005; Jones and Baldwin 2009; Jorgenson and Sullivan 2009; Auken, Paul et al. 2010), visitor-employed photography (Garrod 2008), and photo voice (Bignante 2010(Loeffler 2004; Loeffler 2004; Beilin 2005; Miles and Kaplan 2005; Garrod 2008; Jones and Baldwin 2009; Jorgenson and

Sullivan 2009; Auken, Paul et al. 2010; Bignante 2010). These will be discussed later in this chapter.

Social Work Case Studies

Jane Jorgenson and Tracy Sullivan used auto-driven photoelicitation to interpret children's relationship with household technology (Jorgenson and Sullivan 2009). Students in selected schools were given cameras and asked to take pictures demonstrating how they and their families use technology around the house. The researchers found that although photoelicitation is relatively effective at allowing us to see how children view their worlds, the children may 'observe us observing them' and may try to conform their photos to what they perceive to be the researcher's agenda. In other words, they might not relax and behave normally while they are taking the photos (Jorgenson and Sullivan 2009). I think that this effect is probably common with adults also and is something that has the potential to alter results of a photo-elicitation study.

Community Development Case Studies

Rod Purcell described how employing photography as an engagement technique could help foster community development, and he reviewed examples of the ways in which photoelicitation, photonovella, and photovoice have been used to achieve this goal (Purcell 2007). Purcell believed that community development must "work on cultural agendas and face up to issues of power and hegemony" and that photography could be an effective tool for doing so. According to him, photography allowed members of a community to show the truth as it is, without influence from outside agendas. However, Purcell made it clear that in order to create real change, photo-based community development must include methods of guiding emotions arising from the pictures. Otherwise, after graphically confronting the issues facing a community, participants may complete the program feeling less empowered than before and less able to take on community problems (Purcell 2007).

Brian Garrod wrote about visitor-employed photography (VEP) as a participatory research technique. Garrod gave cheap disposable film cameras to both

residents and tourists in a Welsh seaside resort town and asked them to take photos of local features that they considered significant. A surprising finding from this project was that the two groups perceived the town similarly. However, not surprising is that VEP proved to be useful in allowing participants to 'take charge' of the research. Garrod noted that although the cost of film cameras was no longer a limiting factor for this type of study, he believed that digital cameras would never come down in price enough to be available for VEP (Garrod, 2008). However, he was incorrect in this belief; digital cameras have recently fallen dramatically in price and are now easily accessible for photoelicitation studies.

Paul Auken et al undertook a participant driven photoelicitation study (PDPE) with rural communities in Wisconsin and Norway (Auken, Paul et al. 2010). Participants in this study photographed what they thought represented positive and negative aspects of their communities. The PDPE methodology was chosen because of its ability to lead to more in-depth interviews (than traditional interviews), provides different types of data than other social science methodologies, and allows the participants to express themselves with little influence from the researcher. The researchers found that PDPE did indeed have these positive qualities, and a new quality, the ability to stimulate people to become more involved in local affairs, was discovered. PDPE encouraged a broader and more thoughtful discussion and led participants to engage more physical with their local communities.

Group Photoelicitation Case Studies

Some studies have employed group sharing and discussion of participant photos, and this methodology has been shown to be effective at eliciting multiple perspectives, enabling participant learning through disagreements, and giving the group a chance to trigger community narratives (Collier and Collier 1986; Thompson 2000; Gallo 2002; Parker 2009)**.** Melina Gallo used group photoelicitation interviews with immigrant workers within a manufacturing organization and attempted to ascertain their perspectives and how they adapted to their new culture. She found that the group photoelicitation process helped them strengthen social relationships and encourage discussion about issues surrounding their lives as immigrants (Gallo 2002). Although not a participant-driven photoelicitation study, Nicoline Peterson and Sille Ostengard employed group sharing of photos with employees of an

organization. They found that group sharing provided for an opportunity of "inside talk", where the members were more open to discussing the inner workings of the organization than they would have been one on one with an outside interviewer (Petersen and Østergaard 2003). John Collier wrote that group sharing is a valuable technique to employ with photoelicitation, but may lose focus if not properly directed by the interviewer (Collier and Collier 1986).

Outdoor/Environmental Case Studies

Outdoor photoelicitation studies have represented the experience of participants on outdoor excursions (Loeffler 2004). Themes emerging from photoelicitation studies of outdoor experiences include the enhancement of connections between people, enhancement of spiritual connections with nature, self-discovery, and new perspectives (Loeffler 2004).

T.A. Loeffler has used photoelicitation to examine what outdoor experiences mean to university students. In particular he wanted to discover the role that photography plays in helping students make connections between their outdoor experiences and their everyday lives. The students who participated in the study were members of outdoor groups who were selected through criterion-based sampling with the criterion being that they had taken pictures while participating in a university sponsored outdoor program (Loeffler 2004).

A total of 14 students were interviewed—seven males and seven females. Three major themes emerged from the interviews: spiritual connection with the outdoors, connections with others through shared outdoor experiences, and self-discovery and new perspectives. Loeffler found that photographs are useful as memory triggers and that they allow students to share their experiences with a larger audience.

Ruth Beilin used photoelicitation with a group of farmers in southeastern Australia to document their relationship with their local landscape. The land in this region is quite degraded, and Beilin wanted farmers to document and discuss their perspectives on the degradation. She gave them cameras, which they used to photograph significant landscape features of their farms. This process not only fostered a sense of place but also encouraged the farmers to discuss their farms from

a land-management perspective.

In another study, Christian Martyn Jones and Claudia Baldwin used Photovoice to disseminate the images created by activists trying to prevent the damming of the Mary River. Photovoice is a methodology very similar to photoelicitation and it combines photography and grassroots social action (Wang, Yi et al. 1998). The researchers gave cameras to the nonprofit organization Save the Mary River, whose members then took photographs demonstrating the importance of the river to their various communities. Twenty-seven of these images were shown to a much larger group, and the researchers subsequently assessed whether these images changed viewer attitude toward the proposed dam. The researchers found that the images containing specific statements about goals—e.g., school groups holding anti-dam signs—were the most effective at attitudinal changes in the viewer group (Jones and Baldwin 2009).

Elisa Bignante turned to photoelicitation to explore the use and preservation of natural resources in the northern Tanzania Maasai village of Mkuru (Bignante 2010). First, she showed tribe members pictures of landscapes with and without a human presence and asked them to choose which they preferred. She then measured their responses using the New Environmental Paradigm (NEP) scale to investigate pro-environmental behavior and attitude. Second, she gave digital cameras to 30 villagers and asked each of them to take five shots of the most significant aspects of their land and lives.

Bigante found that participants enjoyed taking pictures and were eager to discuss their photos. The most common photos taken were of cows, goats, sheep, and courtyard animals. Because these animals are indicators of wealth in Maasai society, these subjects were anticipated. In addition to providing rich data about the Maasai culture and tribe member's relationships to the land, Bignante reaffirmed the power of the photoelicitation interview (PEI) to bridge geographical and cultural gaps. Bignante stresses that PEI does not replace but instead supplements and deepens conventional interview techniques (Bignante 2010).

Fostering Environmental Attitudes

Iris Bergmann utilized photoelicitation in order to study how people develop

their cognitive perceptions of environmental issues. She found that photoelicitation helped them develop new attitudes toward environmental issues. Participants broadened their initial view, multiple perspectives were constructed, and their own positions and feelings were clarified (Bergmann 1999/2000).

Gene Myers wrote a well-researched paper describing the psychology of photographic imagery in communicating conservation messages. One of his key themes is that images have the ability to elicit powerful emotions, both positive and negative. He stressed that use of negative imagery needs to be limited so as not to discourage the viewer from taking a positive action (Myers 2006). Although photography can be a powerful tool for fostering environmental attitudes, caution is called for when using negative imagery.

Relevance To Thesis

As a tool of marine education, underwater photoelicitation uses waterproof cameras to capture the marine environment. This technique is new and, until now, undocumented in the academic literature. However, it is expected to elicit the same kinds of responses in participants as does terrestrial based photoelicitation, for both techniques involve people interacting intimately with non-human nature and taking photos of their experiences.

Chapter 3- Research Methodology

3.1- Research Technique Overview

Underwater Photoelicitation

This chapter introduces underwater photoelicitation, a new technique for experiential marine education. Underwater photoelicitation involves a group of snorkelers taking photos and then sharing these photos with the researcher and with the other members of the group.

The major research question is: Does underwater photoelicitation increase awareness, foster connection, change attitudes and led to positive environmental actions towards the oceans?

To reiterate from the introduction, the experiential marine education program designed to test this new technique is called Show Us Your Ocean! (SUYO!). The process of underwater photoelicitation was tested using as subjects both adult residents of a coastal community (Dunsborough, Western Australia), and high school students from inland and coastal regions of Perth.

The name "Show Us Your Ocean!" was chosen because the program was intended to allow people to discover what the ocean means to them, through direct experience and photography, and give them the tools to portray the ocean how they saw it. My intention was not to teach the participants how to think about the ocean. The program was run in three phases: a pilot study, community workshops, and high school classes.

Mixed Methods

The mixed methods research used by this study combine qualitative and quantitative research techniques.

> Researchers for many years have collected both quantitative and qualitative data in the same studies. The idea of mixing the data, the specific types of research designs, the notation system, the terminology, the diagrams of procedures, and the challenges and issues in using different designs . . .are new features that have emerged within the last [15 years]. (Creswell and Clark 2007)

The mixed method technique, which is often used in environmental education studies, employs induction (discovering patterns), deduction (testing theories and hypotheses), and abduction (ascertaining and then relying on the best explanations for understanding results) (Johnson and Onwuegbuzie 2004).

3.2- Theoretical Models

This section covers psychological models that justify attempts to foster change in people's attitudes and intention to act toward the marine environment. It sets forth which factors influence people to act a certain way, dissects what makes up attitudes and why they are important when studying human behavior and interaction with the environment, and explains what makes someone act in an environmentally responsible manner.

All graphics are taken from Carl Stepath's 2006 thesis Coral reefs as sites for experiential environmental education: Learning with Australian students – a foundational study, and have been modified from their original sources (Stepath 2006). I use these graphics because Stepath has studied marine experiential education extensively, and his thesis closely parallels mine. An in-depth discussion of each model can be found in the chapter entitled *Theoretical Framework: Methodological, epistemological and ontological approaches* (Stepath 2006).

Theory of Planned Behavior

One of the most widely used concepts in environmental psychology and environmental education is Icek Ajzen's theory of planned behavior (TPB) (Ajzen

1991), which attempts to explain why individuals act in certain ways. The model is described below.

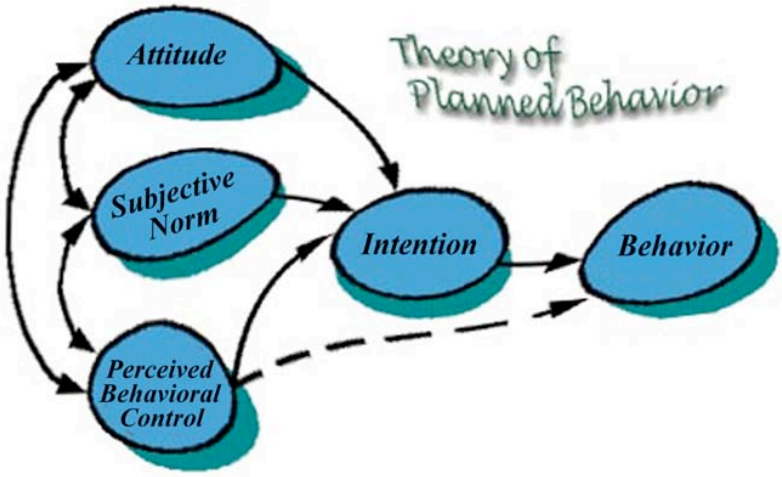


Figure 2. Theory of Planned Behavior based on model from (Ajzen 1988) and taken from (Stepath 2006).

According to the theory of planned behavior, behaviors are influenced by intentions and perceived behavioral controls. Intentions are influenced by attitudes, subjective norms, and perceived behavioral controls.

Attitude is the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question.

Subjective norms are the perceived social pressures to perform or not perform the behavior.

Perceived behavioral control is the perceived ease or difficulty of performing the behavior that is assumed to reflect both past experience and anticipated impediments and obstacles (Ajzen 1991).

The altered model below, taken from Carl Stepath's PhD thesis, shows how direct experience and education might influence attitude and lead to intention to act (Stepath 2006). This model demonstrates one of the key ideas of this thesis—that

direct experience in the ocean and sharing photos of this experience—may lead to an attitude change.

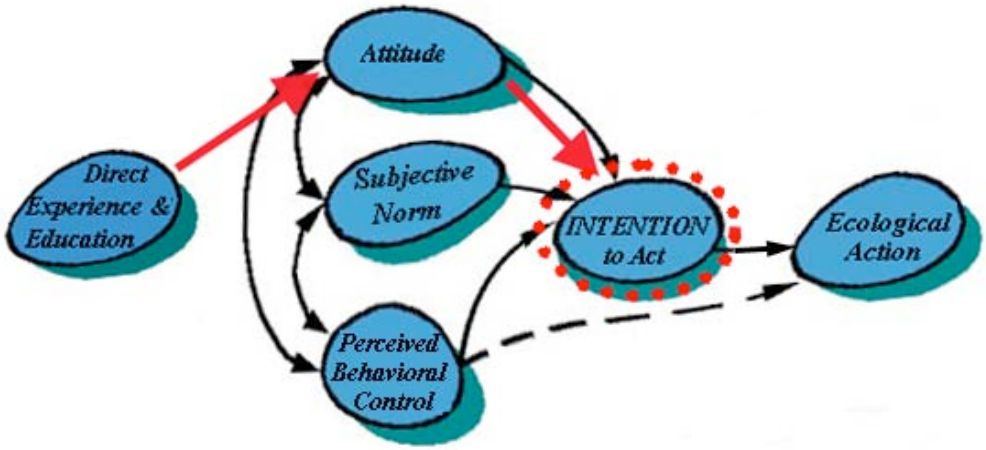


Figure 3. Direct experience, education and Theory of Planned Behavior modified from (Ajzen 1988)(taken from (Stepath 2006)

If participating in an experiential environmental program can lead to a change of attitudes, this change could help influence intention to act (Hungerford and Volk 1990; Millar 1996; Mittelstaedt 1999).

Components of Attitudes

Having examined how attitudes can influence intention to act, we will now examine the variables that make up attitudes themselves. According to Susan Clayton and Gene Meyers, attitudes are "evaluative reactions to objects or behaviors based on beliefs about those objects or behaviors. They serve to summarize and integrate our values and beliefs as they apply to a particular issue" (Clayton and Myers 2009, p. 19).

Icek Ajzen and Martin Fishbein describe attitudes as comprising three major components: cognition, affect, and behavior. The model below summarizes their concept (Ajzen and Fishbein 1980).

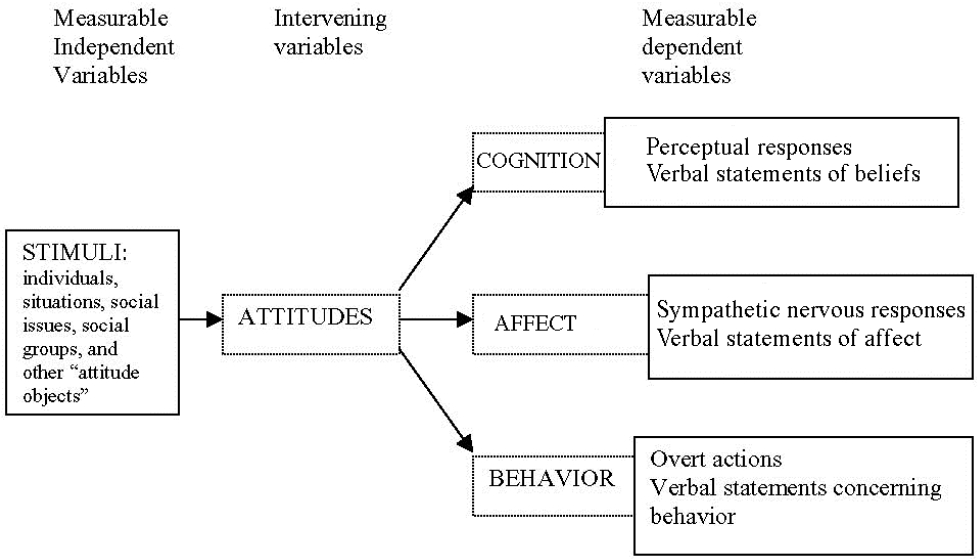


Figure 4. Cognitive-Affective-Behavioral Model of Attitudes (Ajzen and Fishbein 1980)

I chose to use the cognitive-affective-behavioral (CAB) model of attitudes in order to understand the impact of underwater photoelicitation on the attitudes of research participants. The CAB model, often in conjunction with the TPB, is used extensively when researching attitudes and intention to act (Ajzen and Fishbein 1980; Millar 1996; Armitage and Conner 2001).

The CAB model of attitudes is significant for the research because one goal of environmental education is fostering behavioral change, and the model is useful at understanding the precursors (attitudes) to such change.

Cognition

As a component of attitudes, cognition includes perceptual responses and beliefs. Perceptual responses relate to awareness of the sensory world around and inside us. These responses include the five senses: touch, sight, taste, smell, and hearing.

Beliefs play an important role in the formation of attitudes. According to the Merriam-Webster Dictionary, a belief is a "conviction of the truth of some statement or the reality of some being or phenomenon" particularly if the conviction is based

on examining the evidence (Webster 2012). Much research has been undertaken to assess the role of beliefs in determining attitudes and behavior, and this research has shown that although an individual may hold multiple beliefs about a particular behavior, only a small number are salient at any one time (Miller 1956; Stern, Kalof et al. 1995). Ajzen (1991) describes three types of beliefs that influence attitudes and intention to act: behavioral beliefs, normative beliefs, and control beliefs. Behavioral beliefs influence attitudes toward a certain behavior. Normative beliefs determine subjective norms and are concerned with how individuals or social groups will perceive an action. Control beliefs relate to how a person views his/her ability to undertake a behavior (Ajzen 1991).

According to some prominent theories, behavior change ultimately comes from a change in beliefs (Ajzen and Fishbein 1980). Although there is also evidence that our beliefs don't necessarily determine our behavior (Brechin and Kempton 1994; Clayton and Myers 2009).. If these theories are correct and if a goal of environmental education is to change environmental behaviors, the focus of educators must be the presentation of information that can lead to a change in environmental beliefs (Pooley and O'Connor 2000; Christensen 2007).

Affect

Affect includes sympathetic nervous responses and verbal statements of emotion. Sympathetic nervous responses are how one's body processes an emotion; verbal statements of affect are the brain translating and communicating this feeling through language.

Emotional responses are very important in the formation of attitudes. For example, if someone has a painful experience in the ocean—e.g., getting stung by jellyfish—he/she most likely will develop a negative attitude toward jellyfish. In contrast, if a positive emotion is associated with a particular behavior, the person will most likely have a positive attitude toward that behavior.

Researchers have shown that attitudes resulting from direct experience are more likely formed through affect than cognition. In contrast, attitudes resulting from indirect experience (textbook learning, etc.) are more commonly cognitively based (Millar 1996; Pooley and O'Connor 2000). Moreover, attitudes gained from

direct experience (affect-based) have also been shown to be better indicators of behavior than are ones gained from indirect experience (Millar 1996).

Behavior

Behavior includes overt actions by an individual and verbal statements regarding his/her actions. These statements can also express an intention to act (Ajzen and Fishbein 1980). Although this thesis does not focus on fostering behavior change, it does nevertheless assess, both qualitatively and quantitatively, change in *intention* to act in an environmentally responsible manner.

Significance of Environmental Attitudes

A goal of environmental education, including Show Us Your Ocean!, is to foster behavior change, and research has shown that attitudes may affect behavior. Strong pro-environmental attitudes have been proven to be good indicators of pro-environmental behavior (Kaiser, Wolfing et al. 1999). Therefore, my research attempts to establish a means of bringing about an attitude change relative to the ocean, and the means that I use is direct experience (snorkeling) and photography. Previous research has shown that analyzing self-taken photographs often creates an emotional reaction in people (Collier 1957; Harper 2002). If this reaction results in a stronger emotional connection between the participants and the ocean, the participants may be more likely to act with greater environmental responsibility in the future (Allen and Ferrand 1999; Pooley and O'Connor 2000). Because photographs in general elicit emotions, they are widely used by activists to educate the public about human destruction of natural environments (Myers 2006).

If there is no affective connection, little hope exists that someone who gains knowledge about an issue will act upon that knowledge. Knowledge gives a person the ability to ascertain his/her place in the natural world, to understand what is problematic in the environment, and to formulate a reaction. But without emotional investment or an attitude that engenders a commitment to taking responsibility for one's actions, little or no change in behavior is likely to occur (Kals, Schumacher et al. 1999).

Model of Responsible Environmental Behavior

Before describing my research activities, I discuss the Model of Responsible Environmental Behavior (REB), a theoretical construct that demonstrates how attitude is a basic driver of the intention to act in an environmentally positive manner. As displayed in the diagram below, the REB model sets forth the variables that influence responsible environmental behavior (Hines 1987).

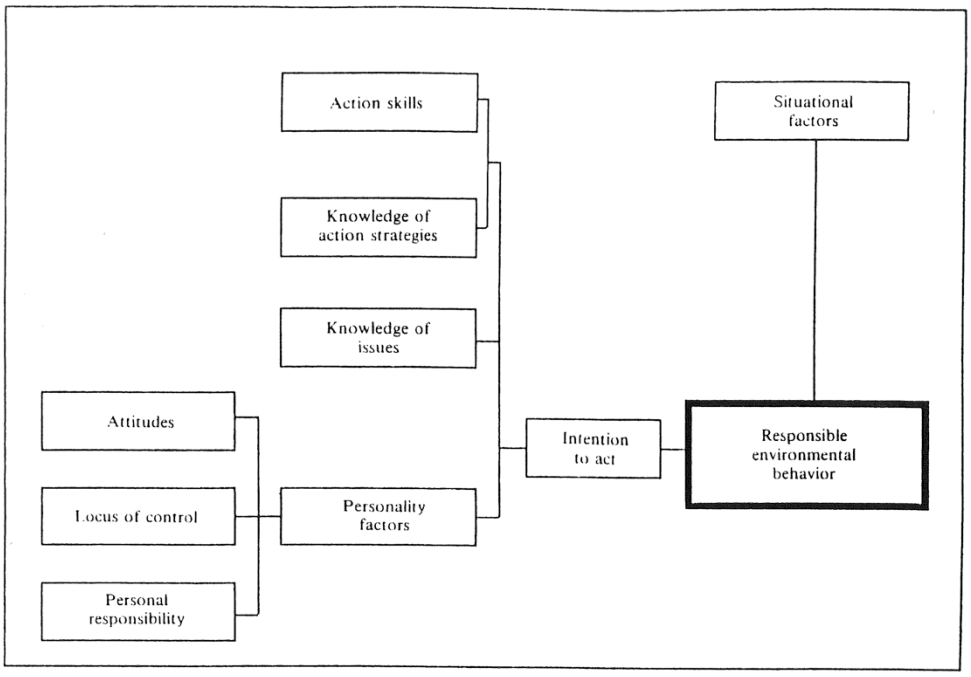


Figure 5. Model of Responsible Environmental Behavior (Hines 1987)

The following chart from Hungerford and Volk 1990 shows the major and minor variables that make up environmentally responsible behavior; some of these variables are discussed in greater detail in this thesis.

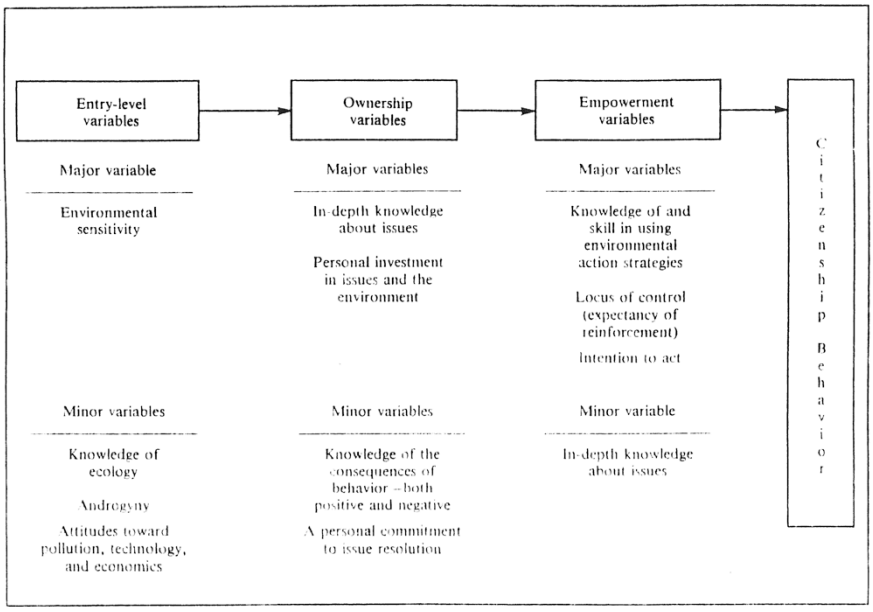


Figure 6. Variables that make up environmental behavior (Hines 1987)

Entry Level Variables

Environmental sensitivity

Underwater photoelicitation seeks to increase the possibility of a person's developing or enhancing an empathetic perspective on the ocean by gaining heightened awareness through direct experience with the marine environment and its creatures. Stepath showed that students felt more connected to the ocean after they had personally experienced it (Stepath 2006). I hypothesize that if a person has a positive reaction to snorkeling in the ocean, he/she is more likely to develop greater environmental sensitivity through an increased sense of connectedness.

Ownership Variables

Personal investment

Underwater photoelicitation might foster a more personal investment in the oceans because people have experienced the environment first-hand and have taken photos that illustrate their experiences. As part of an increased sense of ownership in the ocean, a person might, for example, become more conscious of the need to ameliorate negative human impacts on the marine environment.

Relationship Between Attitude and Intention To Act

Research examining how knowledge impacts environmental attitudes and intention to act has shown mixed results. In a review by Franz Bogner (citation?), studies showed that knowledge could foster pro-environmental attitudes, but not intention to act, (Bogner, 1998 #470) while others showed no relation between knowledge, attitudes and intention to act (Maloney 1975; Armstrong and Impara 1991). Other studies have shown that there is a significant relationship between knowledge, attitudes, and intention to act (Ramsey and Rickson 1976; Borden 1979; Newhouse 1991). Weak correlations between attitude and intention to act were discovered by a meta-analysis of 128 empirical studies completed by Jody M. Hines et al (Hines, Hungerford et al. 1987). Bogner found that there was a weak positive relationship between outdoor ecology education and pro-environmental orientation, and that stronger shifts were associated with longer programs (Bogner 1998).

High school students often have little preexisting knowledge about environmental issues (Gambro and Switzky 1996; Kuhlemeier, Van Den Bergh et al. 1999). Prior studies seeking to influence student attitudes and intention to act toward the environment with high school students focused on conveying environmental knowledge (Bradley 1999; Kuhlemeier, Van Den Bergh et al. 1999). These studies also found student environmental knowledge prior to the educational interventions fragmented and limited. One study found a strong correlation between increase of knowledge and positive changes of environmental attitudes (Bradley 1999). However, a significant relationship between knowledge and attitude was not found by Kuhlemeier et al 1999 (Kuhlemeier, Van Den Bergh et al. 1999). It appears that there are conflicting results with research focused on examining the relationship between environmental knowledge, attitudes of high school students and their intention to act. What can be concluded is that increased knowledge alone does not necessarily lead to changed attitudes or intention to act in high school students.

Previous studies have also shed light onto what high school students think is important and what is not with regard to environmental issues. One study of Australian high schools has shown that if environmental issues do not directly impact the students, then they are unlikely to think about them. While the students felt like people could work together to change the world in a positive manner, they also

expressed pessimistic attitudes about the future and that 'money will win out over the environment' (Connell, Fien et al. 1999). These attitudes correspond to some of the more pessimistic responses in the current quantitative data.

Previous research studying the impacts of direct outdoor experience on environmental attitudes and intention to act with high school students have shown mixed results.

Outdoor education programs have been shown to impact attitudes and intended behavior change, but only when ecologic knowledge was an important aspect (Bogner 1998). Bogner acknowledged that the amount of time that students participated in outdoor activities correlated positively with improved attitude and intention to act. Therefore, he concluded that change with regards to attitude and intention to act could occur, providing the program is of sufficient duration (Bogner 1998).

After participating in residential environmental education programs, students had more positive attitudes towards wildlife (Dettmann Easler 1999). Stepath found that students had more positive attitudes and more positive intention to act towards the marine environment after directly experiencing reef environments (Stepath 2006). However, other studies have shown that found that direct experience only has a small effect on intended behavior change (Tanner 1980; Bogner 1998). In balance, it can only be concluded that direct experience will not necessarily lead to intended behavior change.

3.4- Show Us Your Ocean!

Ethics Approval

This section discusses the ethical considerations for both community and school-based phases of the research.

Because the research dealt with human subjects undertaking potentially dangerous activities, Curtin University required its highest level of ethics scrutiny—Ethics A. There were two phases of Ethics A approval: the first for the pilot study

and community workshops (adults), and the second for high schools (youth). For each phase of research, two separate applications were made and passed by the Curtin Human Research Ethics Committee. Each phase had its own unique ethical considerations.

Phase One Ethics A Approval (Adults)

This application dealt with issues relative to adults snorkeling, taking underwater photographs, and participating in workshops and in-depth interviews. Because participants were adult volunteers, the issues were less complex than those relative to working with minors in schools.

Procedure: Taking Underwater Pictures (STAGE 1 PHOTOELICITATION STUDY):

The risks of snorkeling, diving, and other interactions with the marine environment were highlighted and assessed. Participants then signed a consent form that clearly laid out these risks, which included physical injury and drowning, and that explained the procedures for safe ocean snorkeling. In addition the form asked participants to confirm that they were physically capable of and experienced at the task that they were undertaking. Participants were required to swim with a buddy at all times. I provided a guide for emergency response and a list of counselors and medical personnel who could treat any injured participant.

Procedure: Interviews

Participants were also involved in a one-on-one, semi-structured interview that sought to analyze their experiences with underwater photography. These interviews, which took approximately one hour, were conducted orally and recorded with a video camera. Many interviewees knew me previously, and all participated willingly. Even though some of the participants were friends of mine, this did not affect the data quality of the analysis of their photos. Perhaps prior their friendship made them want to answer more positively about the program, but there is no way to

test for this and even participants who I did not know answered positively about the program.

Participants signed a release and an additional informed consent form for the video interview. Because at all times the camera was pointed at the desk where the pictures were being analyzed, the participants' faces were never visible. The release and both consent forms are included in the appendix.

Procedure: Workshops

In the workshops, all participants were expected to respect one another and to be attentive to what each had to say. In the unlikely event that any unpleasant memory surfaced or issue arose, counselors were available to participants.

Phase Two Ethics A Approval (Schools)

Ethical issues were related not only to safety but also to protection from liability for the participating schools. The Department of Education for Western Australia was consulted for this part of the research, and appropriate measures were taken to fulfill department guidelines. The teachers and parents of participating students signed consent forms after reading information sheets. These forms are included in the appendix.

Procedure: Snorkeling field trips with digital underwater cameras

Risks to the participant that could have resulted from interactions with the marine environment included physical injury and possible drowning.

The snorkeling field trips were organized and supervised by teachers and the appropriate number of bronze medallions—two, including the teacher and me as the researcher. Participants signed a consent form that clearly stated the physical risks associated with snorkeling. The form required them to confirm that they were physically competent and experienced at the task that they were undertaking in the ocean. It clearly stated the correct and safe procedures for entering the ocean, including a requirement to swim with a buddy at all times. Students had a permission

slip signed by their parents to allow them to go on the snorkeling fieldtrip and to participate in the research.

I provided a snorkeling safety guide that set out all the necessary safety measures. Students did not have to enter the ocean if they did not want to. An emergency guide was included which spelled out the necessary steps to take in case of an emergency. For the teachers I also had available a list of counselors and appropriate medical experts in the very unlikely event that they would be needed. Other safety guidelines were clearly stated in the Department of Education's Guide for Water Based Activities (Section 19). The research adhered to the Department of Education's guidelines on water-based activities.

Procedure: Classroom Activities

In the classroom setting, risks to students, which were no different from those commonly identified, were managed by the teacher's standard protocol. I communicated with the teachers prior to their participation, and the research was described to them before they were asked to participate.

Data were de-identified in order to maximize privacy for the participants. Although students filled out worksheets, they did so anonymously. Questions included their age, prior experience in the ocean, and gender. The justification for collecting this information was to be able to categorize responses at the end of the research. Teacher contact information was collected for the purposes of giving and getting feedback about the experience. This information was also kept confidential.

Pilot Study

In January 2010, after I received Ethics Form A approval from Curtin University (Phase 1), I organized a pilot study on Rottnest Island off Perth that involved eight participants, most of whom were my colleagues and friends from Curtin Sustainability Policy Institute (CUSP). This program allowed me to test the methodology and the research questions I had designed. We also tested the Snap Sights SS-1000 cameras, which I had chosen to use, to see if they would perform adequately.

Before beginning the excursion, I gave participants a short PowerPoint presentation on the basics of underwater photography. After the presentation we left as a group and took the ferry to Rottnest Island. Once there we took the bus to the northwestern side of the island, where the participants entered the ocean. I made it clear that they were free to go anywhere and take pictures of anything that they wished. After a few hours of snorkeling and exploring, the memory cards on their cameras were full, and we returned to the mainland.

Over the following week, I conducted the first underwater photoelicitation interviews with the pilot study participants, who were pleased by their photos. I enjoyed looking over and discussing their work. Participants had a lot to say about their images, and the interview data were high quality. The cameras had fulfilled their role admirably, taking beautiful pictures both under and above the water.

Community Workshops

This section describes the community SUYO! workshops run in the summer of 2010 in Dunsborough, WA.

SUYO! Website

The SUYO! Wordpress website, showusyourocean.wordpress.com, was created as an information portal for anyone who wants to find out more about the program and about underwater photoelicitation. My contact information is listed so that people who want to participate in future studies can get in touch with me. Sections were created for both community participants and for teachers who want to establish the program in their schools.

Program Design

After the pilot study was completed and the methods were found to be feasible, I ordered 20 additional cameras. In March and April of 2010, two Show Us Your Ocean! programs were run in Dunsborough, WA. The participants, 17 mostly female adult community members between the ages of 18-35, were recruited through

flyers, emails, the project website, and word-of-mouth in the Dunsborough, Yallingup, and Margaret River communities. All people who applied were accepted.

At the beginning of each program, a training lecture was held at Samudra (a yoga studio and café in Dunsborough) to explain the basics of compositional photography and some technical aspects of underwater photography. Participants filled out a questionnaire that was designed to assess attitudes toward and experiences with the ocean. Cameras were handed out at the end of the lecture, and participants were given two weeks to take their photographs. Each participant also chose a date for interviews.

After the participants took their photos, in-depth, semi-structured interviews were conducted. Questions were asked about their experience in general and how taking these photos represented the coastal/marine values that they held. For each photograph, a series of four questions was asked:

1. What is the subject of this photo?
2. Why did you take this photo?
3. What are the artistic elements in this photo?
4. How does this photo make you feel?

At the conclusion of each interview, participants were asked to choose three to five of their favorite photos to share with the rest of the group. Although they were deliberatively given no guidance or criteria for choice of their favorite photographs, many chose photos either because of their aesthetic value or because of the story behind the photograph. These favorite photos formed the basis of discussion for the final workshop held after the interviews concluded.

The final workshop brought all the participants together again. Each person's selected photos were projected onto a large screen, and a group analysis of these photos followed. Each photograph was described/assessed for its subject, emotions/feelings, artistic elements, and new learning. I facilitated the workshops to ensure a free-flow dialogue in which each member of the group had an equal opportunity to respond to every photo. While I helped the dialogue along at times, I never defined the direction of the conversation and only occasionally prompted the group.

Responses were recorded and subsequently entered into Excel for further analysis. At the end of the workshop, participants were asked to fill out a workshop evaluation, which ultimately provided data on the effectiveness of underwater photoelicitation as an educational technique. Through this questionnaire, participants were given the opportunity to reflect on their entire experience. In addition, the questionnaire allowed me to assess whether the participants' cognitive, affective, or behavioral domains of attitudes had been affected by participating in the study.

School Program

During 2010, I worked with five high schools in the Perth metropolitan region and the surrounding area: South Fremantle SHS, Balcatta Senior High School, Busselton SHS, Comet Bay College, and Leeming SHS. All classes were year 10s with the exception of Busselton, which was year 12. The schools had been recruited through emails and flyers sent to HotRock's network. The emails and flyers had links to the SUYO! website so that interested teachers could contact me.

SCHOOLS	EXCURSION LOCATIONS
South Fremantle SHS	Robbs Jetty, HMS Omeo
Balcatta SHS	Mettams Pool
Busselton SHS	Busselton Jetty
Comet Bay College	Penguin Island
Leeming SHS	HMS Omeo

Fig 6.9- Schools and Excursion Locations

Although more than five schools contacted me initially, some did not follow through with the program, mostly due either to rigid procedural and bureaucratic structures or safety concerns. Nevertheless, I was surprised by the fact that working with the participating schools and their motivated teachers was easy and pleasant.

At each of the schools, the program began with a one-hour PowerPoint presentation and training session using the underwater cameras. Students were given a workbook that described the program and that prompted them to fill out each section as it was completed. They also filled out a pre-module survey and a pre-

fieldtrip questionnaire. Two schools opted for an additional one-hour pool training session with the snorkeling equipment and cameras. Once these training sessions were completed, classes went to various coastal locations around Fremantle and Perth (listed later). Students snorkeled and took pictures. Because sometimes the weather was less than ideal and sometimes students and teachers wanted additional experiences, a few schools went on multiple fieldtrips.

Once these fieldtrips were completed and students had assembled all their photos, I ran a one-hour computer lab during which the students made PowerPoints of their favorite pictures. (One school needed more time for the computer session.) Afterwards the students, as a group, discussed their favorite pictures using four questions as a focus of the discussion:

1. What is the subject of this photo?
2. Why did you take this photo?
3. What are the artistic elements in this photo?
4. How does this photo make you feel?

During the discussion, we talked about their experiences in the water and asked the class to discuss each picture. The focus questions were often asked to get the student discussion back on track if students became distracted. In general, one hour was a short amount of time for students to complete both the PowerPoint and the class discussion. Students were given feedback forms and post-fieldtrip questionnaires at the completion of the program.

After the program was completed, additional sessions were run for interviewing students in groups of four and teacher individually. These interviews provided important and helpful feedback on the program.

Locations of Excursions

Both the school and community programs were run in the Southwest of Western Australia. Four of the schools were located in Perth, and one was located south of Perth in Busselton. The Southwest region is shown in the map below.

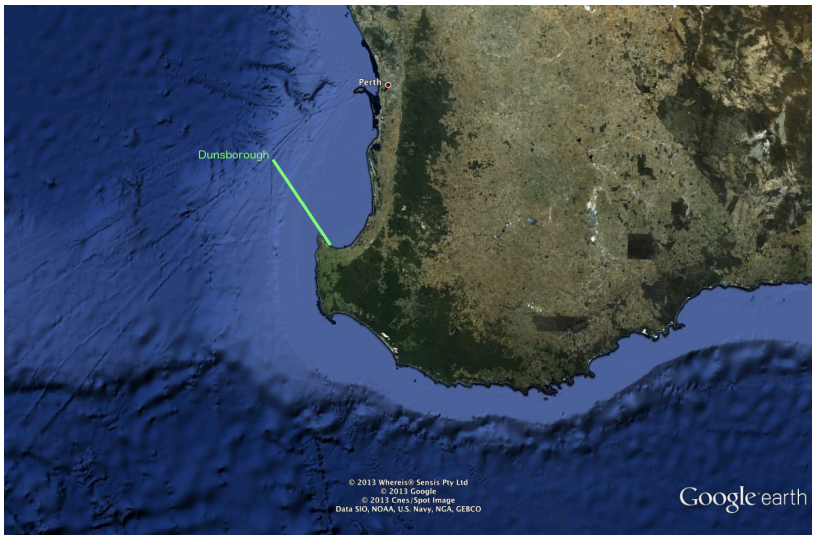


Figure 7. South West Western Australia

The map below shows most of the greater Perth metropolitan region. Most of the schools excursions took place within this region.

Figure 8. Greater Perth Region

The map below shows Dunsborough and surrounds, where the community workshops were run. Most of the photos came from the region shown on the map. One participant ventured further south, near Margaret River (not shown on this map). Most of the snorkeling took place in Geographe Bay north of Dunsborough or close to Yallingup, on the exposed coast west of Dunsborough.

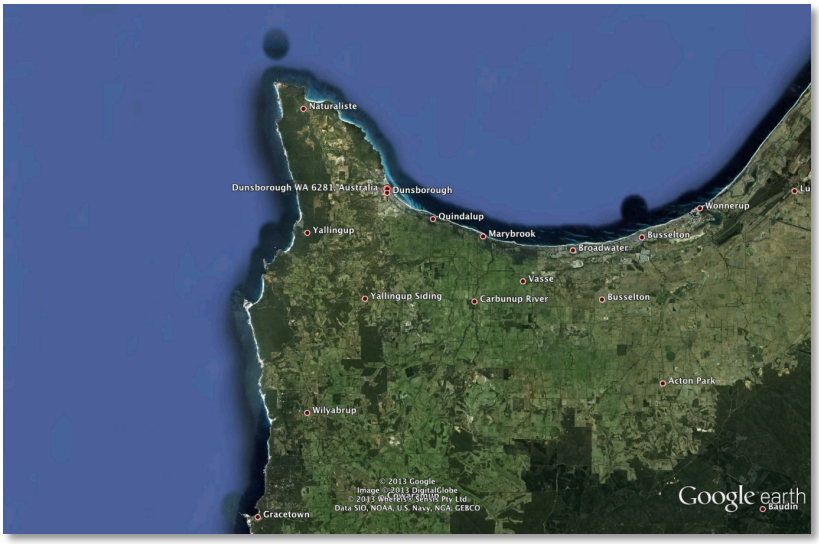


Figure 9. Dunsborough and Yallingup

The school locations for the excursions are now discussed in more detail.

Mettams Pool

A natural rock basin protected by a surrounding reef, Mettams Pool is located just north of Trigg Point in Scarborough, WA. This scenic area, known for its clear water and variety of marine organisms, has long been a popular summertime snorkeling spot. Mostly sand and boulders cover the interior of the pool, and its outer edges are a mosaic of large limestone rocks and hollow caves. The shallow reef shelf extends out from the pool and then drops off precipitously to about 5m of water.

Figure 10. Mettams Pool, North Beach, WA.

Robbs Jetty

Located in South Fremantle, WA, Robbs Jetty consists of remnant pylons from an old jetty that was removed during the 1960s. Extending into Cockburn Sound, a large sandy bay south of Fremantle, these pylons create an artificial reef that provides a hold for many marine organisms. Because the jetty lies in approximately 5-8m of water, this spot is well suited for divers; however, the pylons lie too deep for snorkeling.

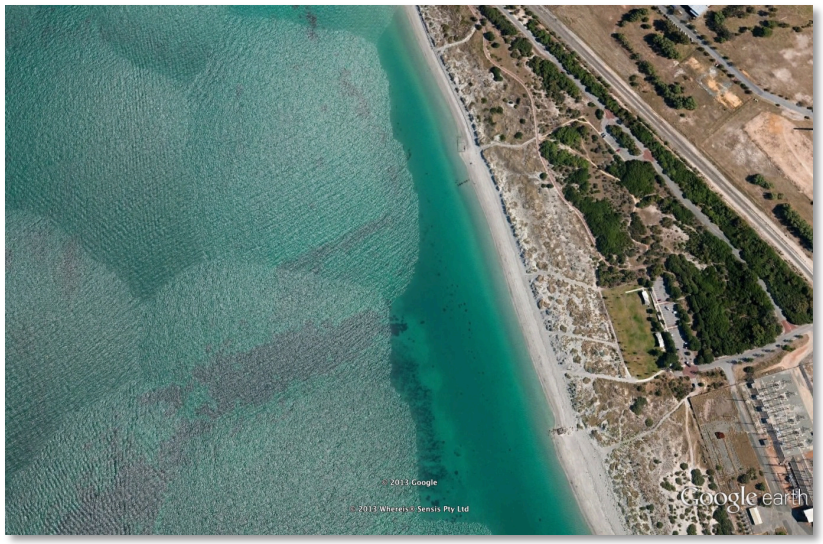


Figure 11. Robbs Jetty, South Fremantle, WA.

SS OMEO Shipwreck

Located in Cockburn, south of Fremantle, this wreck of a large iron barque is one of the few wrecks visible above the water. The Western Australian government plans turn into a reserve for snorkelers and divers. Access to the wreck is easy and the spot is relatively sheltered because a breakwater for a new housing development has been built next to the old ship. The pictures below are from one of the Leeming SHS excursions.

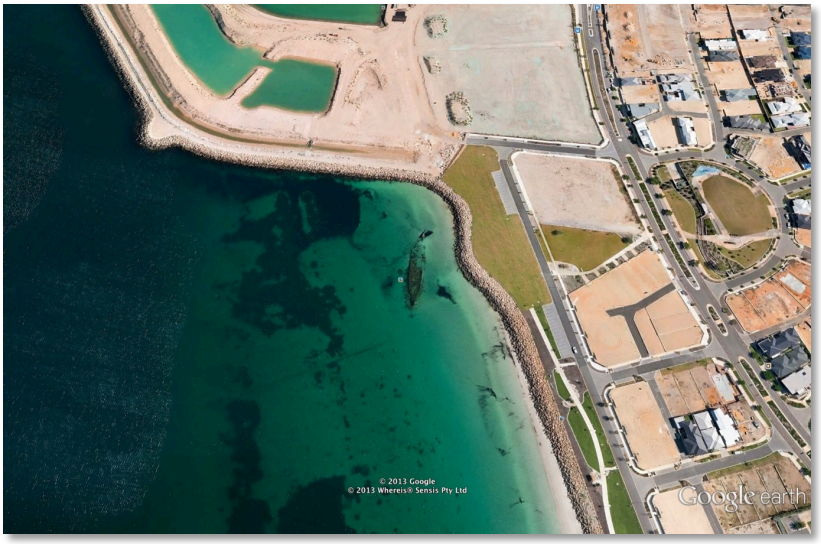


Figure 12. HMS Omeo Shipwreck, Cockburn, WA.

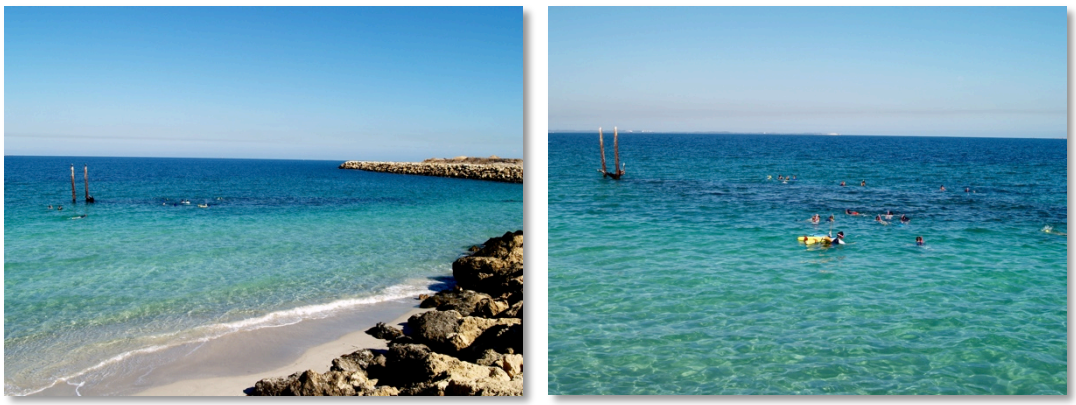


Figure 13. Photos taken from the breakwater toward the HMS Omeo. Snorkelers are Leeming SHS students.

Busselton Jetty

The longest wooden pier in the southern hemisphere is located in Busselton, WA. The Busselton jetty extends almost 2km into Geographe Bay, a large, sandy bay dominated by sea grass communities. Its pylons provide home for many marine organisms and the jetty is a popular site for snorkeling and diving. In fact, many local dive agencies run tour groups here. Construction on the pier began in 1853 and continued until the 1960s. Busselton Jetty also has an underwater observatory located near its end.

Figure 14. Busselton Jetty, Busselton, WA.

Penguin Island

Penguin Island is a 12.5 ha island off the coast of Rockingham, WA south of Perth. It is surrounded by Shoalwater Islands Marine Park and has the largest population of Little Penguins in Western Australia. The island is a popular tourist destination to come and witness the penguin colony and for snorkeling, kayaking, and other marine sightseeing.

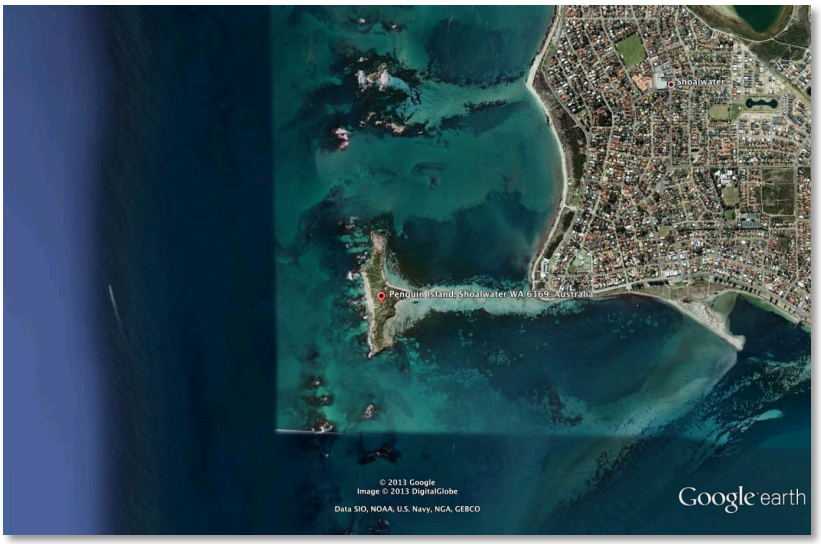


Figure 15. Penguin Island, Rockingham, WA.

Descriptions of Schools

South Fremantle SHS

Located in Beaconsfield, WA, South Fremantle SHS was the first school I worked with. The year-10 marine studies class was generally well behaved, although student attitudes were at first problematic. In addition, because I was a novice, I was a bit nervous, not knowing what to expect from the students. Over time, however, I developed a good relation with the class, and we had a lot of fun on the excursions.

Unfortunately, despite my best efforts, I could not persuade the teacher to allow the fieldtrips to take place in the morning when the sea breezes are lighter and the students are fresher and more amenable to a new experience.

Our first field trip was to a submerged jetty off Cockburn. That day the wind was strong, and we swam around for 45 minutes before we located the jetty. By that time, most of the students were too tired to dive down and take pictures. We also discovered that the jetty was in quite deep water and that this site is therefore better suited for scuba diving.

The following two field trips were to wreck of the HMS Omeo, also off of Cockburn. The wreck is in shallow water and close into shore, and the snorkeling was much more satisfactory than the previous jetty dive. One of the fieldtrips was especially memorable due to the fact that the students sustained many stings from the jellyfish that filled the water. I had an ear infection at the time of that snorkeling trip, and was therefore spared the wrath of the jellies. The students took many quality pictures that day but unfortunately most of these pictures were subsequently lost when my hard drive crashed.

The photo workshop was difficult not only because we had to split it into two days, but also because the computers were not working. Students were easily distracted, and many did not complete the task adequately. In addition the presence of a substitute teacher on the first day resulted in a lack of monitoring. The class discussion was also more difficult than with other groups because the students were not engaged.

Balcatta Senior High School

At Balcatta SHS I worked with students in the ACCESS program, whose goal is to help students gain job-related skills. Most of these students were from a disadvantaged background and leading a difficult home life. Many lacked self-confidence when it came to learning, and were in the program to gain the skills that they would need to get jobs. Few were on an academic track and many went to school part-time and worked part-time. The teachers in charge of the program frequently ran out of the classroom activities with the class, and SUYO! provided a new experience for the teachers and students.

Although in the beginning I was a bit intimidated by the class, I relaxed after the first pool session when I could see that the students would enjoy the activity. We ran two fieldtrips, taking the class to Mettams Pool just north of Trigg Point—an

ideal site for snorkeling and photo taking. On the first fieldtrip weather was a bit choppy and grey with some swell, but on the second field trip the weather was perfect with blue skies, clear water, and tiny swell.

A majority of the class had never snorkeled before, and most students stayed in the shallow inner pool. Only a few went outside the pool to the ledge beyond. The students who did not want to go into the water at all took pictures on the beach.

I found it quite interesting that the students' behavior changed dramatically once we arrived at Mettams Pool. Negative attitudes, quite evident in the classroom, faded as students became engrossed in the outdoor experience. However, once back in the classroom', the students more mature attitudes disappeared. It was extremely difficult to keep them on task while they were looking through their photos on the computer; many students were checking Facebook and looking up videos on YouTube. In addition one of the full time teachers was absent that day, and having a substitute in the class did not encourage the students to be on good behavior. Despite the difficulties, most students eventually chose their favorite pictures and made a short PowerPoint. Unfortunately, during the discussion the class was distracted and some students were rude, and I struggled to get a dialogue established about the photographs.

Busselton SHS

The year-12 marine studies class at Busselton SHS was very easy to work with. From the start, I could tell that these students were overall engaged and excited to be doing the program. Moreover, their swimming skills were excellent, and they obviously already had strong connections to the ocean. The year 12's acted much more like adults than did the year 10's.

For this class I ran two field trips to the Busselton Jetty. On the first, the weather was stormy, and the water was very murky. However, on the second trip, we had perfect weather that encouraged students to take many photos. Student behavior was consistently good onsite and their swimming skills were excellent.

On the second trip, we were constrained for time and had to return to the photo workshop on the same day as the fieldtrip. We had less than an hour for the students to choose their favorite pictures, make a PowerPoint, and engage in the class

discussion. Although many students were rushed, both the pictures and the discussion were of excellent quality.

Comet Bay College

The class at Comet Bay College was small; only eight students participated. Unlike with the other schools, the principal would not allow the students to go snorkeling. The students were completing a coastal morphology project, and the teacher and I combined their class assignment and my research into one fieldtrip. We took the class to the foreshore at Penguin Island, where they wandered the beach taking photos of various coastal features. The photos enhanced the drawings that they had been assigned to do for the morphology project.

Once we were back in the classroom, the students chose their favorite pictures fairly quickly, and we proceeded to have a very good class discussion. The students were well behaved, and I was impressed with their levels of excitement. Of all the classes, they were probably the most engaged in the discussion of the photos.

Leeming SHS

Leeming SHS, located east of Fremantle, is surrounded by native bushland. Leeming students were different from the others because they volunteered for the program after their teacher explained it to them. I ran a pool session at a neighboring high school with the students to get them used to snorkeling and taking underwater photos. The teacher, who was enthusiastic about SUYO!, brought plastic animals to throw into the pool so that the students would have subjects for their practice pictures.

We met in Cockburn at the HMS Omeo, which the students swam around and photographed. The day was fair and sunny, and the students swam for about half-an-hour. When they came in, they were happy with their snorkeling and excited to see their pictures.

The following week, during the photo workshop in the computer lab, most of the class was on task—a result, I believe, of having a good teacher who motivated them. In addition, the class discussion was more focused than with the other groups.

3.3- Qualitative Methods

Community Workshops

Community qualitative data came from individual photoelicitation interviews and pre-program and follow-up questionnaires.

Pre-SUYO! Questionnaire

A questionnaire, given to the participants before they started the SUYO! program, sought to determine beliefs, emotional connections, memories, and behavior vis-à-vis the ocean. Demographic information including age, gender, occupation, and schooling, was also collected.

Photoelicitation Interviews

I made a video recording of individual, semi-structured photoelicitation interviews using a camera facing my computer. With the camera in this position, the video showed only the photo being discussed and not the face of the participant. Having the photographs on video allowed linkage with the textual data. The interviews lasted an average of 30 minutes, during which I asked the focus questions for the first few photos, and then permitted the participant to continue in a more narrative style. I returned to the focus questions if the interviews went off track.

Post-SUYO! Questionnaire

After they completed the program, participants were given a written questionnaire asking them to reflect on their experiences. It asked them to describe knowledge and awareness they had gained, and to identify any changes in their behavior, attitudes, and perceptions of the ocean.

Schools

School qualitative data came from student workbooks, group interviews, wrap up questionnaires, student PowerPoints and teacher interviews.

Student Workbooks

Students were given workbooks containing information about each lesson in the SUYO! program.

Pre-SUYO! Questionnaire

A pre-SUYO! questionnaire, entitled 'The Ocean and You," attempted to elicit the meaning that students place on the marine environment and to identify their prior experiences with the ocean, their memories about those experiences, any fears that they might have regarding the ocean, and any threats that they perceive to the ocean's future.

Lesson 1- "Introduction to Underwater Photography and Safe Snorkeling"

An introductory classroom lesson described the excursion, presented information about safe snorkeling, and explained underwater photography techniques. A snorkeling worksheet with three wrap-up questions tested student knowledge about safe snorkeling.

Lesson 2- "At the Snorkel Site"

This lesson contained questions to be answered at the beach. Because they were sense-based, the questions helped students "feel" where they were.

What is the current weather (amount of sun, wind, precipitation)?
What do you smell?

What the does ground look like?
What can you hear?
What does the ocean look like? What is the visibility like?
What is the temperature like?
How do you feel in this place?
Describe three features you think are significant

Lesson 3- "Picture Download in Computer Lab & First Analysis"

This lesson covered the work students did on computers–choosing their favorite pictures, making their PowerPoints, and answering the four focus questions about each slide.

What is the subject of your picture?
Why did you take this picture?
What artistic elements/effects do you see in this picture?
What emotions do you feel from the picture?

Lesson 4- "Our Underwater Pictures"

This lesson explained how the group discussion would proceed. The students' favorite photos were discussed, and the three focus questions asked to the students when examining each photo, were presented in this lesson.

What do you think the subject of the picture is?
What artistic elements/effects do you see in the picture?
What emotions do you feel from the picture?

Student PowerPoints

The student PowerPoints contained each student's favorite pictures. His/her answers to the four focus questions were superimposed on each picture. An example of one of the student's slides is below.

Class Discussions

Using a projector, I showed each student's favorite photos to the entire class. I then asked the four main photographic questions for each photo that was shown. The class discussions that followed were recorded with an audio recorder.

Student Follow-Up Questions

At the completion of the program, I gave students two pages of questions asking such things as: What kind of new experiences did you have? What was your favorite part of the exercise? Will participation in the program change any of your interactions with the ocean? These questionnaires are located in the appendix.

Student Group Interviews

After the completion of the program, I was able to interview a total of three groups of students who came from two different schools—one from Leeming SHS and two from South Fremantle SHS. Each group comprised four students. I asked follow-up questions regarding how they related to the program, what they liked best, what they learned, and how this experience might change their attitudes or behavior toward the ocean. These semi-structured interviews were recorded with an audio recording device.

Teacher Interviews

I also conducted one-on-one semi-structured interviews with teachers from three of the five participating schools. Interviews took place outside of class time and usually in the faculty room of the teacher involved.

Qualitative Data Analysis

Definition of Coding

In this study, the dominant research technique is qualitative. The majority of the data comes from answers to questionnaires, excerpts from individual and group interviews, and group discussions. These data are analyzed via coding, in which text-based information is arranged into themes that emerge from the data.

Commonly used by qualitative researchers, a code *"*is most often a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data*"* (Saldana 2009, p. 3). The themes found in the text allow a story to be induced from the data.

All coding was completed using Nvivo9, a Windows based qualitative data analysis program produced by QSR International. Nvivo9 is used when there is a large amount of text-based or multimedia data that needs to be analyzed and is used by a wide variety of social science disciplines (International 2012).

Because there was such a large quantity of qualitative information, I could not do all the transcribing myself; I had the help of not only a research assistant (Tanha Mahjabeen) but also SmartDocs, a company that specializes in transcription. The resulting Word documents were then imported into Nvivo9. The data were coded and examined using various coding techniques.

First Cycle Coding

The coding that occurs initially is called first cycle (Saldana 2009). These processes comprised provisional, holistic, emotion, and values coding.

Three different data sets were coded: the community workshop data, the student data, and the teacher data. All three were first coded using a provisional coding methodology: The Cognitive-Affective-Behavioral domains of attitudes—C-A-B, which is commonly used in conservation psychology research (Clayton and Myers 2009; Saldana 2009).

Provisional coding employs a "start list" set of codes determined prior to the time when fieldwork begins (Miles and Huberman 1994, p. 58; Saldana 2009). In this case, C-A-B was a good "start list" because I knew that we wanted to examine attitudes and intended behavior change. The C-A-B framework allowed for large chunks of data to be distributed between the Cognitive, Affective, and Behavioral components present in the data through the process of holistic coding.

Holistic coding is a broad-brush technique that does not break apart separate sentences. Rather it attempts "to grasp basic themes or issues in the data by absorbing them as a whole [the coder as 'lumper'] rather than analyzing them line by line [the coder as 'splitter']" (Dey 1993, p. 104)**.** Paragraphs are read and coded, often times falling under multiple codes.

Within the holistic coding framework, there were two predominant sub-codes; emotion and values coding.

Emotion coding "labels the emotions recalled and/or experienced by the participant" (Saldana 2009, p. 86). The coding of emotions was central to the organization of data, as much of the dialogue provoked by photos or the experiences in the ocean were emotional in nature.

Values coding is the "application of codes onto qualitative data that reflect a participant's values, attitudes, and beliefs, representing his or her perspectives or worldview" (Saldana 2009, p. 89). Values coding was the predominant method of coding for these data because many of the data that were coded related to participants' attitudes, beliefs or values towards the ocean and their experiences in it.

This first-stage coding allowed themes of the cognitive-affective-behavioral framework to emerge from the data. Some sub-themes, such as *beliefs*, linked with Ajzen's model of attitudes while others, such as *perspectives* and *skills*, emerged from the data independently (Ajzen 1991).

Themes that emerged from the data were:

Cognition: Perspectives, Beliefs, Observations, Knowledge

Affect: Emotions, Spirituality

Behavior: New Behavior, Skills

These themes were then broken down into even more specific sub-themes. A few are listed below:

Knowledge: New Knowledge, No New Knowledge, Remembered Old Knowledge

Perspectives: New Perspectives, No Change

Beliefs: New Beliefs, Existing Beliefs

Emotions: Negative, Neutral, and Positive

Behavior: Existing Behavior, New Behavior, Favorite Activity

Second Cycle Coding

Second cycle coding methods are used to reorganize and reconfigure first cycle codes into a smaller and more select list of themes (Saldana 2009). This process allows the researcher to see how everything fits together, and re-assemble the codes as needed in order to better tell the story emerging from the data.

After the coding was split into the C-A-B framework, I reshuffled the codes using a variation of 'pattern coding'. Pattern codes are "explanatory or inferential codes, ones that identify an emergent theme, configuration, or explanation. They pull together a lot of material into a more meaningful and parsimonious unit of analysis." (Miles and Huberman 1994, p. 69)

An in-depth reading of the data revealed the following core themes:

- Core Theme: Direct Ocean Experience
- Core Theme: Awareness
- Core Theme: Beliefs
- Core Theme: Affect
- Core Theme: Photo Attributes

- Core Theme: Perspectives
- Core Theme: Intended Behavior Change
- Core Theme: Program Feedback

The C-A-B framework was revisited and explored to determine if any codes within the previous framework could be moved under the new categories.

Once the new core themes had been established, each core theme was reviewed in-depth. The new classification of data resulted in a new hierarchy:

Core Theme

Theme

Sub Theme

Through this review, themes within the core themes could be nested. For example, within the core theme of awareness, there were two themes—experience based and knowledge based—for which specific examples could be described. Sometimes sub-themes emerged from themes if further classification was necessary, however for most of the data sub-themes were unnecessary. The example below lists a core theme with its associated themes and specific examples (no sub-themes).

<u>Core Theme: Beliefs</u>

Theme: Spirituality

Sub-Themes: Connection to the Ocean, Self-Awareness, Sense of Wonder

Theme: Human-Ocean Relationship

Sub-Themes: Human Impacts, Stewardship, Respect, Humbleness, Bond To Nature, Appreciation, Personal Journey

Theme: Photography

Sub-Theme: Views of themselves as photographers

Once this structure was in place, the data was easily categorized and laid out, and the stories that emerged from the interviews and other qualitative sources, told.

3.4- Quantitative Methods

Quantitative results for the school data come from pre-and post-questionnaires that reveal any shifts in environmental attitude or intention to act. The pre-module survey gives information about student and correlations about certain environmental attitudes and behaviors. These surveys were assessed empirically through statistical analyses.

Explanation of Pre-SUYO! Demographic Survey

A pre-SUYO! survey was given to the schools, and most of the students who participated completed it (N=54). The survey was based on one created by Dr. Carl Stepath, and some questions were altered to better fit the research and were made up-to-date (Stepath 2006)**.** For example, instead of asking students whether they use chat rooms, I asked about Facebook usage. This survey, which gathered data on student demographics, environmental behavior, and attitudes (beliefs), allowed me to determine the students' relationship to the marine/terrestrial environment prior to their involvement in the program.

The survey included multiple types of questions; some were fill-in the blank; some were yes or no; some were multiple choice, and some asked for rankings. For example, with the latter questions, students were asked to rank their favorite pastimes from 1-7. Multiple choice questions asked about activities such as snorkeling and swimming and gave the students five answers to choose from—never, seldom (1-5 times/year), often (5-9 times/year), very often (more than 10 times/year), and certified SCUBA diver. The fill-in questions asked basic information including name (not used), school, date, and year in school.

Explanation of Attitude/Intention to Act Questionnaire

A pre and posttest questionnaire was designed in order to assess whether there were any shifts in student attitudes and intention to act towards the ocean after participating in SUYO!. The questionnaire utilized a 6-point Likert scale and was closely related to the questionnaire that Carl Stepath used in his experiential marine

education program (Stepath 2006). 6=strongly agree, 5=somewhat agree, 4=mildly agree, 3=mildly disagree, 2=somewhat disagree, 1=strongly disagree.

The questionnaire was given to five schools; however, due to lost data from some forms not being returned, only data from three schools were included in the final analysis. The final analysis of the pre and post questionnaires included a total of 35 students (the same students) from 3 schools. The data were reduced to make sure that the samples were homogeneous (the same students from both pre and post questionnaires). The three schools were very different socioeconomic backgrounds and were had very different experiences with the ocean environment. Even though the data was reduced to 35 students, this sample is quite heterogeneous and a good mix of students from different backgrounds.

Justification of the questions used in the questionnaire is similar to the questionnaire used in Carl Stepath's dissertation (Stepath 2006). This questionnaire closely parallels his because our research is very similar; both examine change of attitude and intention to act of high school students towards the ocean after participation of a direct ocean experience. However, Stepath focused on attitudes and behavior towards 'coral reefs' in particular, whereas I examined the broad temperate ocean experience.

Quantitative Data Analysis

There were two major sources of quantitative data from the school programs; a demographic survey and a pre and post attitude/intention to act module questionnaire.

Pre-SUYO! Demographic Survey

Pre-module surveys were handed out to participating classes. There were two major goals of the survey: to find out certain demographic information and to find out the amount and kinds of experience students had in and around the ocean and other outdoor environments.

The surveys were administered to all students, but in order to compare the survey results to the results of the pre and post attitude/intention to act questionnaires (described in the next section), the total number analyzed was reduced. Some

questionnaires did not have corresponding demographic surveys, so these questionnaires were taken out of the final analysis. There were a total of N=29 students who had completed demographic surveys and completed pre and post attitude and intention to act questionnaires. Therefore, the data that will be presented in the quantitative results chapter is only pertinent to a subset of the overall sample. Three schools are represented in the data (Leeming, Balcatta, and Busselton SHS) with a total of 29 students.

Pre-Post SUYO! Attitude/Intention To Act Questionnaire

Students filled out attitude and intention to act questionnaires before participation in the program, and after the final lesson had been completed. The intention of the questionnaire was to find shifts in student attitudes and intention to act towards the ocean. Statements were presented to the students and they answered how strongly they agreed or disagreed with that particular statement using a 1-6 point Likert Scale format (1=strongly disagree, 6=strongly agree).

The data were tested for normality using both Kolmogorov-Smirnov and Shapiro-Wilk tests for distribution. Almost none of the data fell within the normal distribution; therefore a non-parametric test was chosen to analyze the data. The Wilcoxon signed-rank test was chosen to analyze the pre and post attitude and intention to act questionnaires since there were two sets of data to compare from the same participants. Significant changes in the ranked means of the variables were discovered. The significant results from this test are listed in the chapter: School Quantitative Results.

3.5- Limitations

SUYO! was far from a perfectly conceived educational program, and the results reflect some design flaws that will be remedied in the future. The problematic areas are discussed below.

Even though the total number of students involved was 73, the quantitative study was completed with a sample of 29 participants. The number of participants who did not complete their forms reduced the size. Because of the time lapse

between each excursion, some teachers and students misplaced their forms, and some students simply did not bother to return them. I made a mistake not only in allowing students to take their questionnaires home and return them during the next session but also in asking that teachers return the completed forms by mail. For future programs I will require that the forms be filled out in class and returned immediately.

The qualitative study was always the first priority for the research, and I did not spend as much time crafting or running the quantitative study. The questionnaires used in the student quantitative study, which were based on those formulated by Carl Stepath, should have been designed specifically for SUYO! Although my study did not contain a knowledge-based component, some of these questions assessed knowledge. Nevertheless, participants' answers reveal the need to integrate a knowledge-based component into programs such as SUYO! In addition to understand the affective responses better, my questionnaire should have included questions not just about attitude and intention to act but also about awareness and emotions.

I also made a mistake in not audio recording the adult workshops. This major omission on my part was due to my lack of experience with qualitative research. However, by the time that the school program began, I understood the importance of recording the group meetings. Unfortunately, the student class discussions were not as in-depth as the adult discussions, which were also were more enthusiastic, focused, and articulate.

The class programs should have been set up so that students could have looked over their photos on the computer before they embarked on their second ocean excursion. Doing so would have given them the opportunity to learn which techniques worked and which needed improvement. This particular feedback, which came directly from the students, will be integrated into future programs.

Chapter 4- Community Workshops Themes

Introduction

This chapter explores the major themes that emerged from qualitative data that were gathered during the community workshops. It attempts to tell a story based on the data about participant experiences with underwater photoelicitation. The main core themes from the community workshops were: direct ocean experience, personal connections to the marine environment, photo attributes, post SUYO! awareness, post SUYO! perspectives, post SUYO! intended behavior change, and program feedback.

4.1- Direct Ocean Experience

New Activities Experienced During SUYO!

The combination of snorkeling and underwater photography was new to many participants, and some also explored new places, saw new things, and interacted with the ocean in new ways.

Exploring New Places

Many participants went to places where they had never before been. Although all had previously spent time on the beach and in the water, snorkeling allowed them to explore underwater.

> *I learnt to look in places I normally don't go and find the beauty everywhere.*

> *It was really interesting to sort of push yourself to go different places and see what is under the water. Because normally I just go swimming. Occasionally I go snorkeling, but not really that often.*

Snorkeling also gave surfers a chance to look under the surface.

> *And I don't know, it's just cool hanging out under the ocean, because I'm so used to sitting on top. And it's good to explore. Yeah, explore down underneath the surface.*
>
> *I think I've learnt to just get out there more and look more, instead of just sometimes you go out and you just surf or whatever, and you're not really taking in everything. It's good to look below the surface and see what's going on.*

Interaction With Marine Environment

Participants experienced the marine environment. Although in the past many had interacted frequently with the ocean, snorkeling with a camera was a new activity for most.

> *It was really nice, just to roll around. Because normally I go surfing.*
>
> *I really enjoyed just having a different way to connect with the ocean. Because normally I'm surfing or swimming, or doing an activity, whereas this was, I was able to just observe and just be in it, rather than be doing something in it.*

One person felt the need to be gentler with the ocean than she previously had been while surfing.

> *I just feel I've always had a really deep appreciation of the ocean, but I felt really humble– I felt the need to be really gentle as well in the ocean, because I was being careful to take pictures and observing the way things were, so I felt like I was treading really gently in there. Whereas normally I kind of go out and surf, and wipe out.*

And a sense of appreciation of the ocean was fostered.

I think combining photography and snorkeling brought back the appreciation of what is there. It's so diverse and it's not in your face because you can't see it most of the time. When you have your polarized sunglasses on you think aw, a beautiful clear day, the ocean looks beautiful but you don't really see how alive it is.

Some described the difficulty using a camera underwater.

I wanted to see how the picture would look with what was under the water and looking back up at the water. So, actually physically getting down and looking up, is sort of a hard thing. Just like holding the camera low and diving down and holding the camera still was really hard.

Some improved the skills they had previously developed.

I practiced diving down. Just sort of really pushing like what you'd normally just muck around and do. It was really cool.

Myself as a student I can only speak and that would be the extra appreciation and I guess I think it's an extra skill.

Difficulty with Activities

Some in-water activities were difficult for the participants. One participant had trouble snorkeling because too many people were fishing in the area.

There were so many fishermen out that day as well—it was hard to swim anywhere without getting picked up by a line. Which was a bit annoying.

Others had problems with the equipment.

> *I found it quite hard to start because I had a mask that kept fogging up and I found it really hard to work the camera and know when I was taking a picture, I couldn't really see the viewfinder.*

Some participants had trouble capturing their subjects on camera.

> *I started chasing schools of small Taylor, just chasing them down. But also trying to get a foreground, background and distance so that you could see where the point of focus is for the camera. Again, you don't know this until you have actually post-processed it. All the fish are out in motion. Its very hard chasing fish, overtaking them and waiting for them to come past because they always go the other way then.*
>
> *My little fishy again. He's really cute. Look how inquisitive he is. That's really interesting. So these are the ones that are really hard, like when*

you're down in the water. It's really hard to keep the camera still. Same with this sort of one. Like, it's really pretty, very different, but it's so hard to keep it still when you're actually under the water.

Getting the focus, focusing on objects and things like that, seemed fairly tricky.

Because the program was run during the autumn when the weather is variable, some participants found that conditions made getting into the ocean difficult.

The only thing that's hard I guess are the conditions and trying to find the conditions so I had to be a little bit spontaneous in the couple weeks I did it. I had to look at the conditions and go, well now's the time and have the equipment ready for when I could go out for an hour and just muck around. Otherwise, I wouldn't have done it though if I didn't have the camera there and this purpose so it really gave that extra sort of making use of the conditions when they did come up.

Summary

Overall, prior to the program, most participants had interacted with the ocean frequently. However, the combination of snorkeling and photography was new for most participants and therefore gave them a *different way to connect* to the ocean. Discovering new underwater places and seeing the ocean in a new light was exciting. Of course, as commonly experienced with any new activity, minor difficulties with the equipment arose, and learning the new technique of underwater photography was a bit challenging for participants. However, overcoming these obstacles motivated participants to refine their skills at snorkeling and underwater photography.

Affective Reactions to Direct Ocean Experience

Participants experienced and described varying emotions as they were going through the program. This theme does not cover emotions elicited from the photographs themselves.

Positive

Many of the emotions that participants experienced were positive in nature.

Pride

One participant was proud that she was participating in the program because she felt that she was part of something special.

> *For me I was actually quite proud to tell people what I was doing. I would say, this is what I am doing and people would look at you and go, ah really? They didn't know they were little disposable cameras I didn't tell them the details I just said, I'm going down to the beach to do some underwater photography because I'm doing a course or whatever and that actually gave me a little sense of I'm doing something that you don't often get a chance to do so I felt a bit special I guess.*

Nostalgia

One participant remembered happy childhood experiences at the ocean,

> *Happy, smiles, yeah. Hanging out with friends, dad Dad and I surfed together a lot when I was a kid.*

Gratitude

Some expressed feelings of gratitude that resulted from interacting with the ocean.

> *I always really appreciate it, and always have moments even when I'm on my board where I just feel so much gratitude towards the ocean. But I felt really humble out there taking photos.*

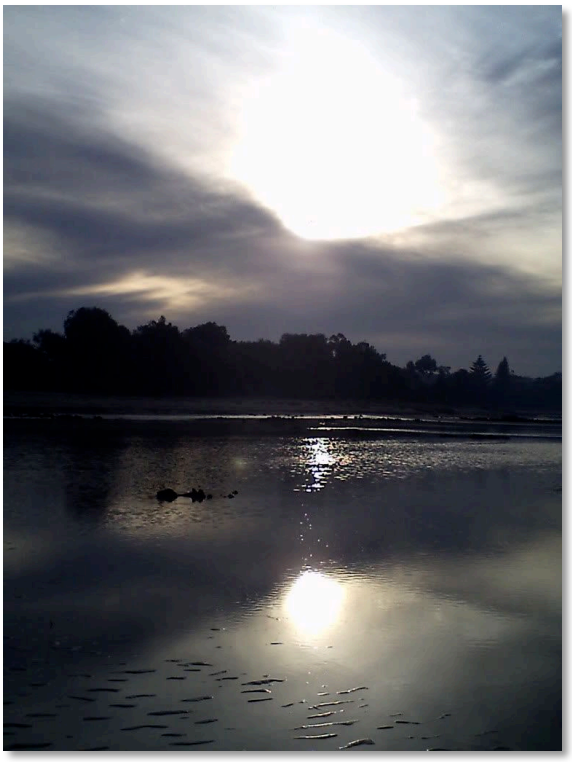
Increased Sympathy for the Environment

One participant expressed feeling more sympathetic toward the environment after participating in the program.

> *I'm more sympathetic to the natural environment.*

Feeling Peaceful

Some participants remembered feeling peaceful when they were interacting with the ocean.



I guess this is out of the water, but it was yesterday when I went out and the water was really shallow. But I just thought it looked so cool, the sunset, and the reflections on everything, and so peaceful, and serene. I was just – I didn't get very many shots but it was just so nice to be there, and to be out there doing it. And that was what it was more about for me; just getting out there.

Negative

Throughout the duration of the program, negative emotions also emerged.

Stupidity

Some participants felt that they were not knowledgeable enough to take acceptable photographs of the marine environment.

I felt stupid, naive. I didn't feel knowledgeable.

Sadness

Human impacts on the ocean made some feel sad.

And it just makes me sad when you see all the things that happen, all the pollution, all the fish dying, and over fishing, and all that sort of stuff going on. It feels like we should be looking after that.

One participant accidently deleted her pictures and felt sad about losing the images.

I wiped my whole lot and I was so sad because I had found all these sea urchins in the Yallingup lagoon.

Inadequacy

Some participants felt that their skills were not adequate for the program..

Yeah it was really good. I mean, to be honest, it wasn't really, I just came because Lana told me about it, but it was really good getting out there and taking some photos and I haven't really got much of the photographic talent ——— did but you know, it just goes to show when you take some, just give it a go.

Nope, I'm not really good at that (photography).

Frustration and Annoyance

Sometimes the equipment caused frustration among participants.

I found it to be an interesting but fun experience, occasionally frustrating- trying to get a shot in focus and accidentally wiping the memory card.

Annoyance

Some people discussed being annoyed by other ocean users.

There were so many fishermen out that day as well; it was hard to swim anywhere without getting picked up by a line. Which was a bit annoying.

And others were frustrated with the camera equipment.

The only annoying thing was that it only gave me such limited, like 10 photos or 13 max. That was the only thing.

Fear

Some participants remembered feeling fearful when they were interacting directly with the ocean.

I'm not sure what her name is (surfer), she's the local girl up there though. Pretty eerie sort of day, like paddled out with a mate and there was two people out there and they paddled in, and it was just me and a mate first. Big school of salmon goes past. It was like a really, really hazy day and pretty eerie out there. I hadn't surfed out there before and the take offs are right on the rocks. The first one I sort of went to paddle onto it, and was like 'Oh, I'm going to die!' <laughs. Then I took off on a big wave, and I was like yeah! Oh not big, but big enough. It was good.

The size of the stingray below scared the photographer.

This is the stingray, look at its eyes….it was so big and it came in pretty close to the shore. It was huge and I was scared. It was great to be in the water near them and close to them but they are still a wild animal, you know what I mean? I think its always good to keep your distance and respect that when it comes to any creature.

I wasn't keen to get too close to them it was nice to go down there and observe and about eight stingrays came in. We went down there mainly to see them and have a snorkel.

Summary

Positive emotions related to direct experiences and to participating in the program were pride, nostalgia, gratitude, increased sympathy towards the natural environment and feelings of peace.

Negative emotions such as feelings of stupidity, sadness, inadequacy, frustration and annoyance came mainly from dealing with photographic equipment and the results of the photography. However, seeing human impacts on the environment also made some feel sad.

Some people remembered feeling fearful when they were in the ocean. Animals—e.g., sharks and stingrays—were the main cause of this fear. This result was especially obvious with one photograph of a stingray that clearly made the photographer fearful. She found the stingray so "huge" that she became "scared." Nevertheless, she also voiced respect for the creature and discussed her belief that marine animals should to be respected. The raw physical qualities of the ocean such as waves and other kinds of water movement also generated this fear-respect coupling.

4.2- Personal Connections to the Marine Environment

Throughout the program, participants' connections to the marine environment were expressed. These connections were spiritual, emotional and related to stewardship.

Spiritual Connections

People generally evinced a very positive and highly spiritual relationship with the ocean when responding to the question, "What does the ocean mean to you?". Their relationship to the natural world was identified overwhelmingly as a positive force in their lives.

Participants expressed their connections to the ocean and the need to be near it. Some people even chose to live close to the sea.

> *The ocean is the sanctuary for wildlife, its the originator of all living things, its yeah, big. I don't really know how to describe that personally.*
>
> *I love it. I like living near it, I love being able to hear it, the smell of it. I get withdrawals from it when I'm away from it for about three weeks. I really need that salt charge and then you know you're swimming in it and it revitalizes you, it's beautiful. Sounds good, sound and smell have got a bit to do with it. And then you've got all the awesome critters that live out there.*
>
> *I live here because I feel more connected with the natural world again. That's kind of why I moved down to this area a bit because I would say generally mountains are my thing more than the sea but I grew up going sailing a lot. I came down here and it because seemed like you had loads of different kinds of marine environments, you had the bush and it all came together nice. Gave you the opportunity to get out, see the different sides of nature and stuff.*

Calming Influence

While snorkeling and interacting with the marine environment, some people felt calmer.

> *Incredible calmness, if I don't see it daily then I go (sigh). It's just my serenity, my spirituality, and my re-charge. Immersing in the water, if I don't have a bath I swim in the ocean. I guess I'm not so much a surfer but walking*

and sitting on the rocks and paddling with me and hearing and seeing the motion so I'm a bit more of an external rather than an internal, getting down deep kind of thing.

Gaining a Sense of Centeredness

Having escaped from their land-based routines, people found, the ocean was a place where they could relax and re-center their being.

I gain a real centeredness and groundedness from the ocean. No matter what's going on in life or in my head, or whatever, going into the ocean seems to like strip everything away and you just come back to your heart.

I think it's a space for people to – for me anyway, to come back to myself and center, and feel whole.

Feeling Cleansed

The ocean temporarily washed away the worries and cares from their lives.

Everything gets washed away, I get really cleansed, and you get a lot of adrenaline as well from riding waves. The ocean's got its own energy, you know? It just seems to lift your spirits.

The ocean is a place of solace, and renewal, and cleansing, and fun, and joy, and it's a place I love to go to at any time of the year and just spend time there.

Rejuvenating

Directly interacting with the ocean gave participants feelings of rejuvenation and enhanced energy and vitality.

The ocean means peace, balance, and rejuvenation. Yep, I always feel amazing after being in the ocean.

I always find it so revitalizing and get a lot of energy.

I get energy and vitality for life from the ocean. It's always been my solace I suppose.

The ocean means life. Just energy and life. It just brings energy and gives life.

Gaining a Sense of Freedom

Participants described the sense of liberation that they experienced in their relationship with the ocean. For them the ocean generated feelings of freedom.

The ocean means cleansing and freedom and its just such an amazing place to be in. its ever changing, an incredible little world. I spend a lot of time in there and I make sure that I pick places I live in that are close to the ocean.

The ocean means freedom, and it just washes away the day, and just kind of get blown away by the things you see, the wildlife.

It means – it's, well I guess for me, surfing. So it is freedom I guess. Freedom, spiritual, harmony most of the time, as long as there's not people there. But if it's just me and the ocean without anyone else, yeah that's what it is. One with nature.

Just freedom, — of the land and just leaving everything behind, leaving your worries behind.

Feeling Humble

Snorkeling and interacting with the ocean are obviously not without their dangers, and people often felt humbled by the power of the ocean.

(The ocean means) Rejuvenation, a slap in the face, humility. So that's my first instinct, humility is the biggest thing I think. When I say slap in the face it brings you back down to the reality of your insignificance.

When you are going in there and diving you are way more aware, particularly with the photography, of your vulnerability in the water because your breath, your life, you're not as safe as you are when you are walking around on land. However, that can be a good feeling. That's where it comes back to that humbleness and the appreciation that the ocean needs more appreciation.

That's where it comes back to that humbleness and the appreciation that the ocean needs more appreciation.

The Ocean as a Metaphor for a Personal Journey

A participant related the motion of the ocean to her personal life journeys and found a way to express this feeling through photography.

That journey back to the ocean, of like the water going out, having it's own path, but then making its own way back to the ocean. I feel like that's been symbolic in my life, always making my way back to the ocean to find me. And I've sort of thought – that seemed to encapsulate that feeling for me, that photo. And it was just beautiful, it was a beautiful moment at sunset.

Emotional Connections

Respect

People discussed the respect that they felt for the ocean, both for its beauty and for its power.

> *It does make me appreciate it more and respect its beauty, mood and energy*

The animals in the ocean also commanded the respect of many participants.

> *There are other animals out there, and you have to respect them and just know that we're in their environment and enjoying it, so look out for them.*
>
> *I think it's always good to keep your distance and respect that when it comes to any creature really.*

Appreciation

People gained more appreciation of the ocean through the photographic process.

> *It does make me appreciate it more and respect its beauty, mood and energy*
>
> *I have a new appreciation towards the ocean*
>
> *There is a pleasure of being there and enjoyment for being in a different environment. Sun, sea, elements, place to enjoy basically.*

Enjoyment

One of the participants was reminded of how much she enjoys taking her dog to the beach.

There's a story to tell about the enjoyment I get about going to the beach with my dog. He interacts with the water and really plays.

Stewardship

Many participants expressed strong beliefs about both about stewardship toward and human impacts on the marine environment.

Because of people's emotional bonds to the ocean, they felt the need to be good stewards of the marine environment, and they recognized the responsibility of all humans to take care of nature.

> *I feel an emotional connection because it can give me so much in return- my attitude is 'protect'!*
>
> *There is a lot of life in the ocean, and we should be looking after it. It is important that each creature, or fish, or whatever, in the whole cycle of everything co-exists.*
>
> *I've always been really conscious of the environment, and obviously looking after it, and just picking up rubbish on the beach and stuff. I'm always in the water, so I'm always conscious of that side of it.*

One participant felt that underwater photoelicitation had the potential to inspire stewardship.

> *Actually having to take photos of things might make people wake up and see how special it is, and how fragile it is, and understand we have to look after it.*

Participant beliefs about humans affecting nature emerged during the discussion of some photos.

I saw a few footprints, and it represents humans' footprint on the environment. Obviously there's a lot of mining going on for those minerals in the sand, and the environment, but we've tried to minimize our footprint on that.

Summary

Even prior to involvement with the program, participants had strong connections to the marine environment. The ocean was part of the daily lives of most

and a necessity of life for many. When they interacted, participants believed themselves to be rejuvenated and more at peace.

Participants were able to express their emotional connections to the ocean through photography and portray how they felt about the marine environment. Because of their strong emotional connections, stewardship toward the marine environment was one of the major attitudes that were elicited from participants.

4.3- Photo Attributes

This section covers participants' responses to the three major questions asked during the photoelicitation interview process.

What is the subject of the picture?

What artistic elements do you see in this picture?

How does this picture make you feel?

Subjects

This theme describes the subjects that were most commonly photographed during the ocean-based excursions.

Fish

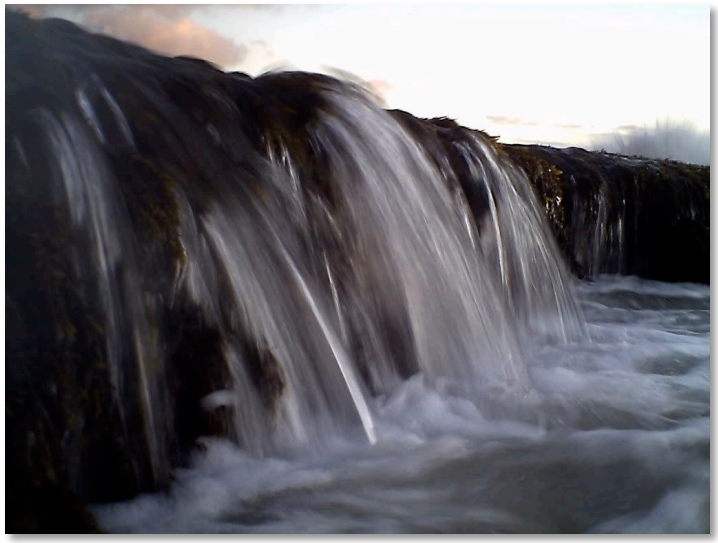
Fish are the most common subject that participants photographed. Unfortunately, because capturing moving subjects generally requires a more sophisticated camera, many shots are blurry.

The fish are a bit closer you can see them a bit more and you can see the light on the fish and also on the weed underneath. You get a feeling of being closer and kind of surrounded by the fish more and being more a part of their environment.

Now that's nice! That's what I was looking for. We've got the forward, the back and the middle. That's very good for that camera quality. I was looking for a good shot of small fry and it was interesting how to maneuver onto it, to go sideways and scare them on one side to get them to go across. It's quite well defined for a camera of that quality and it actually flows through. But having a shoal that deep you are gonna know that one of them is going to be in focus.

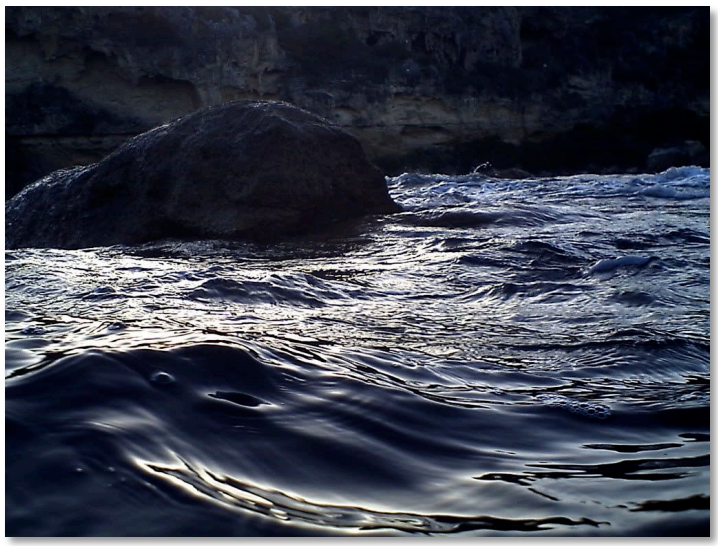
Water

Many participants focused on taking pictures of water.



I just focused on the water coming off the reef. It was kind of soothing, watching all the water spilling off. And I liked the idea that it is almost like land and sea, but that's reef. So when I was taking it I was thinking of like waterfalls and stuff. So I kind of liked that, because it could almost be like 50 meters high, and a waterfall. And I like that ambiguity.

One participant focused on the surface of the water.



I liked the way the water was moving around the rock, so it was surging and yeah it looked really cool and I think the rock probably had drifts coming off it, that wasn't close enough.

Another of the participants was playing with her niece and nephew at Yallingup Beach when the children threw a rock into the water.

I got my nephew to throw something in the water. How's that? That's just wild. The kids were all covering themselves in the black sand. So that was fun. The splash is the subject. It just looks like metal. It just looks like a big creature coming out of the water. Just crazy. And I just love like the texture and the deepness of the grey of the sand. But it's just wild. I just think it captures just the way water can be. It's just so versatile and so amazing and it's just got its own energy to it. I mean, that is just like throwing a rock in the water.

Landscapes

A shot of Yallingup at sunset captured the beauty of the evening.

There's probably three subjects, because I was trying to capture the Cape, the land coming out there, looking back to [Sugarloaf], and there's actually the wave There's a peak that's come through, there's actually a surf going left and right from that one wave. There's that rock that just sits there in the middle of the lagoon, and it's nice and protected in the lagoon, and you've got surf in the background. So yeah, I just love it.

The old jetty in Hamelin Bay is often photographed by visitors, including one of the participants who focused on it.

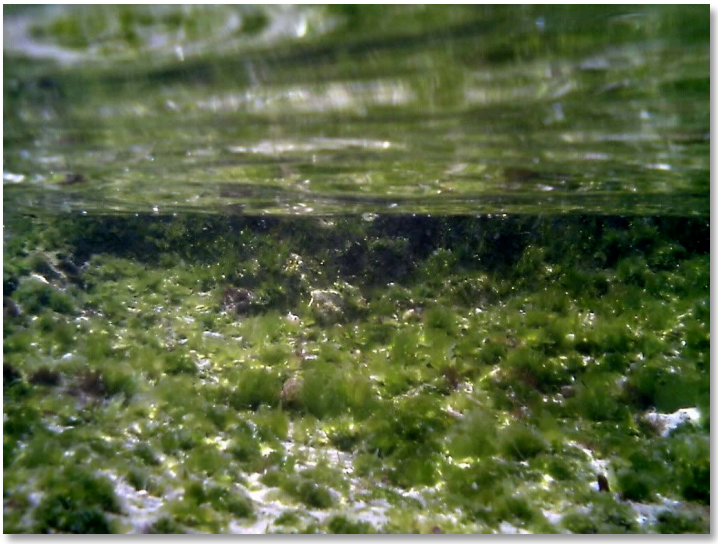
I think it used to be an old jetty, I'm not really sure. Its really one of the main features down there at Hamelin Bay, its right there on the shore as soon as you get there. The stingrays are coming right in close; this is where we were standing when we were checking out the stingrays. I like birds.

Reflection

Participants captured the reflection of the reef on the surface above.

That's quite successful in the top bit I think. From this point of view, it's the reflection in the top, its more artistic than anything else I think. The content isn't as good it could do with some of those fish in there. From this point of view it's the quality of the camera I guess.

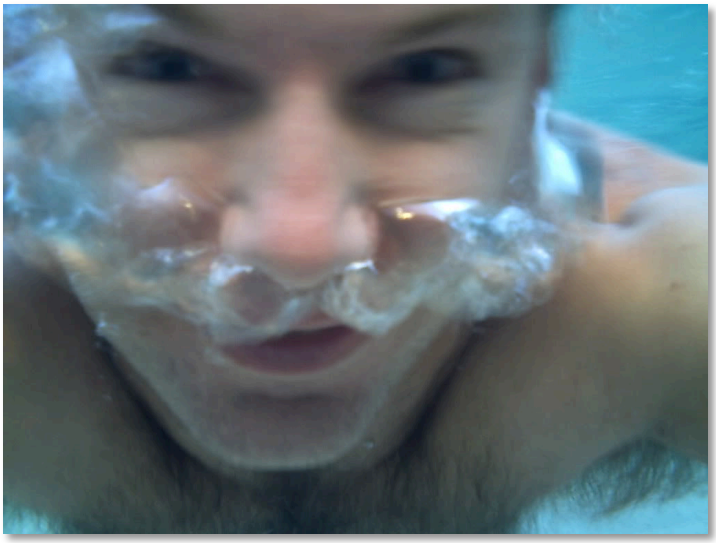
I like the water, like the surface, the reflection, yeah. It's really cool.



Definitely looking at the surface and the reflections and stuff. I wanted to get a photo that had that surface reflection stuff in it because I like it. Its got light and ripples, but reversed from what we normally get when we are on top. I took that one close to the shore where it was calm and I could maybe get less movement and get something in focus.

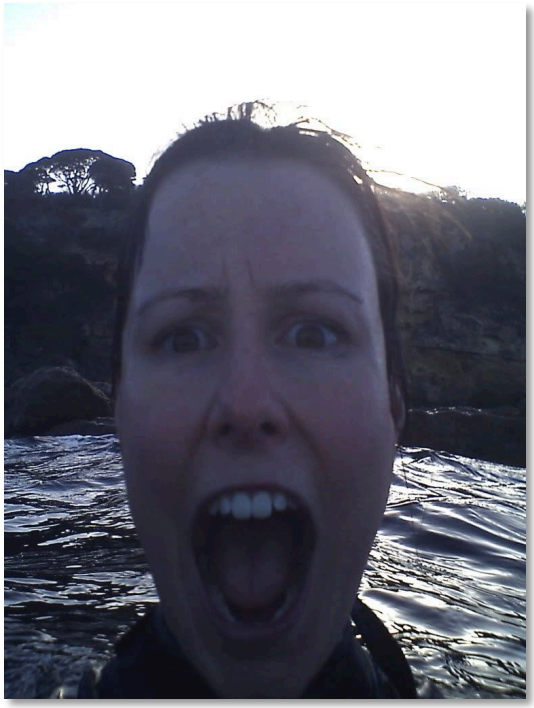
People

One participant took an underwater self-portrait.



That sort of came out how I wanted it, with some bubbles. And they just look sort of weird up against myself. <laughs> Yeah, it's like an air moustache.

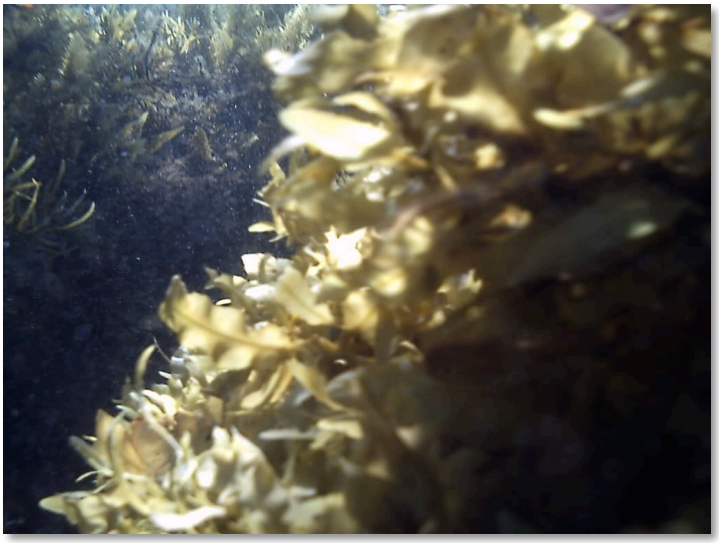
Another participant took a self-portrait with her head sticking out of the water.



I think that's very artistic in a way. I have always been a fan the self-portraits. I don't really know what to say!

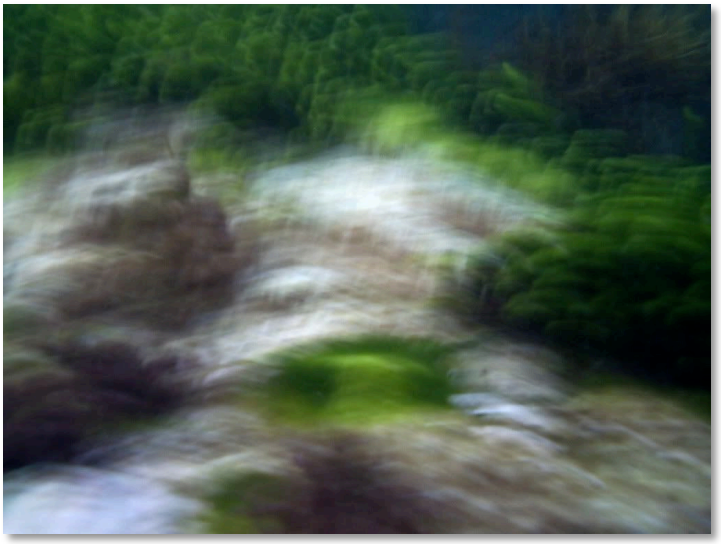
Algae

Because of its prominence in the marine environment, algae were common subjects.



That's seaweed. The light I guess was the subject of how it sort of is on the weed. I think that's still in the lagoon. The perspective in there I think is the one thing I really enjoyed about this picture and how you sort of have the background which is coming into focus a bit more.

This blurry image shows shallow green algae growing on the reef.



It's just the rock in the water. It was on my feet and quite mossy...and it was shallow, it's quite close to the surface, I thought, you know, the water was really gloomy so it's a bit blurry. The beautiful greens have turned out really awesome. I really like it.

Light

Light is an extremely important element in underwater photography, and some participants captured amazing shots that made light a subject in itself. The picture below shows a school of little fish and the light ray patterns across the sand.

This one I think I was just trying to take a picture of the fish but I like it unexpectedly for the light from the surface that's gone through onto the sand. I don't have anything huge to say about it but it's mainly the pattern and the light that is quite pleasing.

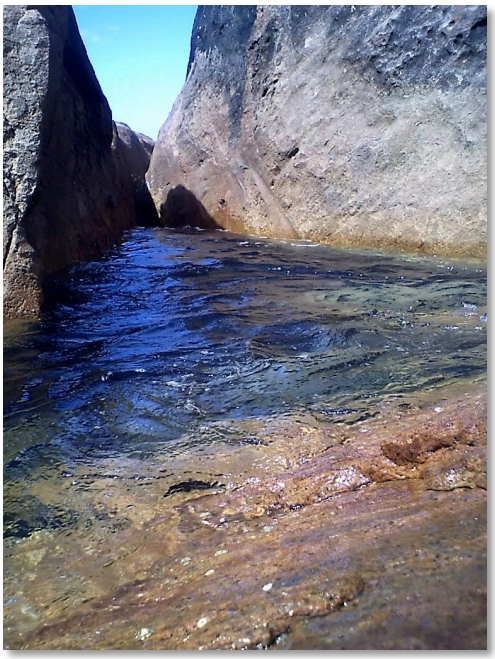
Waves

Many of the participants are surfers, and a few captured beautiful images of waves.

That's one of my favorites. It's only a little wave, but it sort of turned out really cool. It wasn't even a great day of surf, and this one just came through and sort of got it right as it was pitching, barreling, and it was really cool. And it looks like a perfect little wave.

Rocks

Rocks also provided interesting subject material for some photographers.



That's just the rock and the sea.

Bubbles

Participants played around with the waves, capturing the bubbles that were in the white water.

Well, I mean to try to recreate that as a sculpture would just be so hard and you know, it looks like meringue, ice, glass, like you just can't capture it and it's just so beautiful. I don't know…you really got the depth. Very different. And that just looks like meringue.

Other animals

Animals other than fish that participants photographed included marine snails and stingrays.

I just wandered around the rocks this time, this was from out of the water looking down onto these shells which were in clumps on the rocks and I thought they were really pretty, really nice pink color with the white and the way they are all bunched together. I like the water and the shapes and reflections that it makes, and I really like the colors particularly on this one.

When she jumped into the water to snorkel, one participant snapped a beautiful picture of a stingray.

It's a stingray. I'm not sure what sort it is. It was the first thing I saw when I jumped in. Like literally got in, put my snorkel on, and he was right there at Greens Pool, just cruising around.

Surfing

Some of the surfers took cameras with them while they were engaging in this favorite pastime.

This is a picture of my surfboard, and surfing with friends. Kind of sums up a lot of time when you're sitting out there, just hanging out waiting for the surfs to come through. We surfed like five hours that day.

Reef

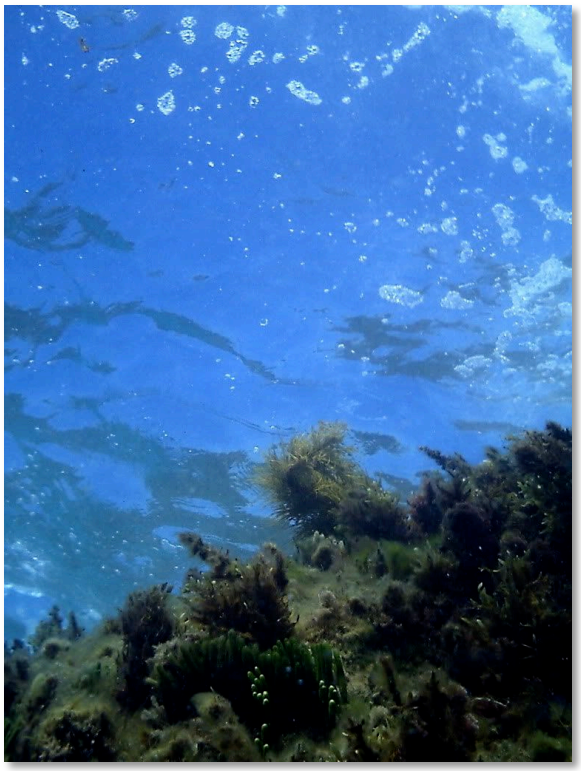
Because it is static, photographing the reef structure was an easy choice.

I love the splash and having everything. You've got your sky, land, waves, and splash. I was getting the splash over the rocks. But the camera really makes the foam look like meringue. See how meringue it looks. It looks like full on. This one, I love that one.

One participant took a photo of the water moving over the reef.

That's like almost a bit more friendly. <laughs> It's not as intense (as the previous picture). It's all frothing down the bottom and stuff. But I made sure that I got that line, at least – like, that kind of thing. So it's a half decent start.

This beautiful seascape shows how the reef looks from an underwater perspective.



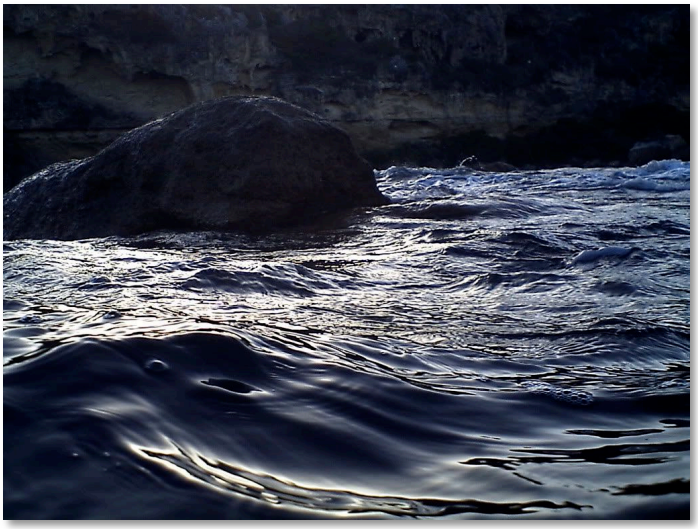
I like the little green things. Where the surface of the water meets the reef or the rocks.

Artistic Elements and Principles

During the photoelicitation interviews, participants reflected on the artistic elements and principles captured in their images.

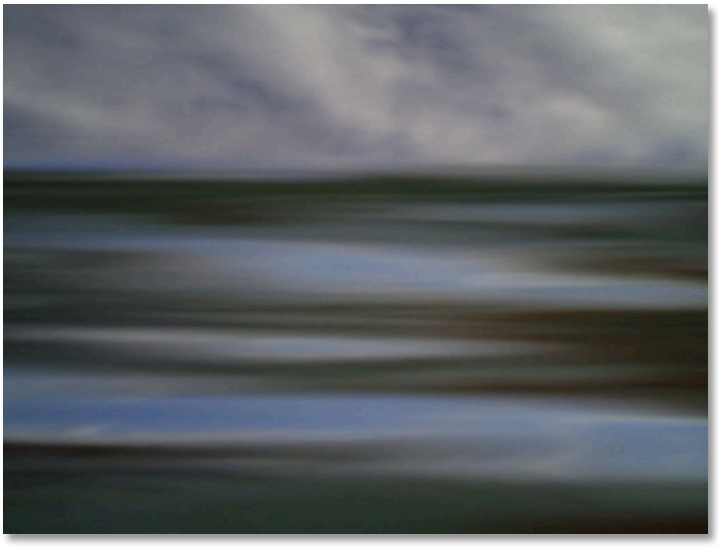
Texture

When the photo below was shared with the group, the discussion focused on the texture on the surface of the water.



Painting Qualities

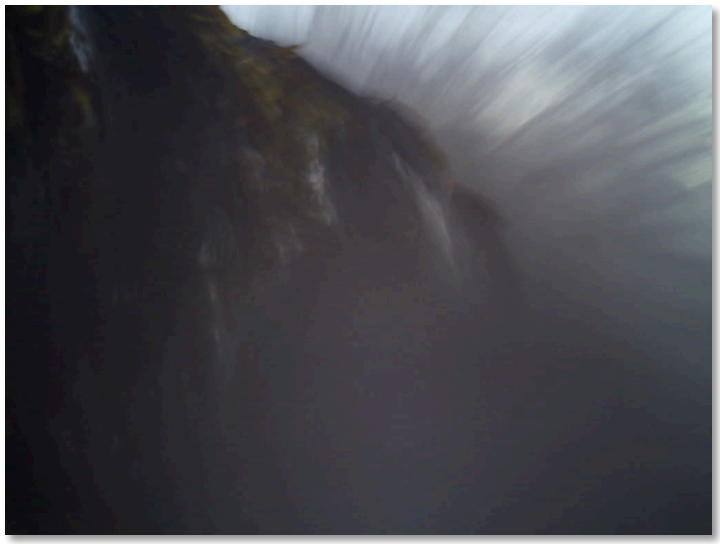
Because some of the shots were blurry or they showed interesting patterns, the participants related them to paintings. This example is of a shot half-way under and half-way out of the water.



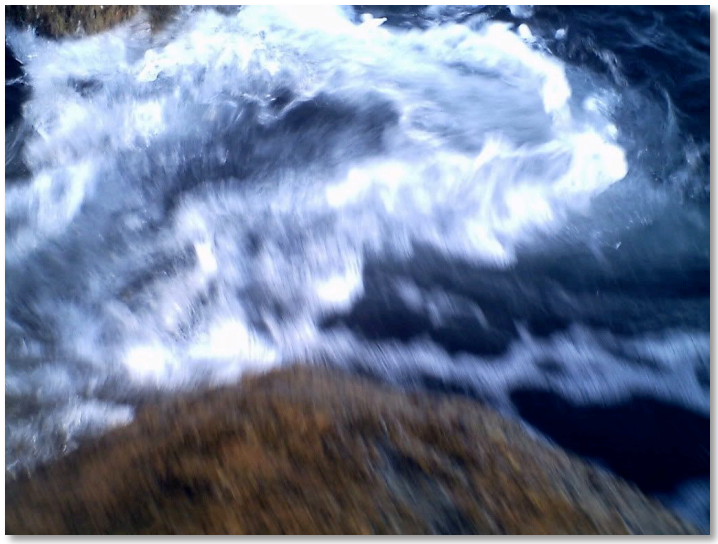
I put the camera half in the water and half out. What a painting that would be! That's just awesome. I love this one. This is my favorite I reckon. So, in between trying to get the splashes, this is like a crest of the wave coming at me and I just had it half out, half in.

Movement

Because many of the pictures were of water, movement was a common artistic element.



I like the way the water's smashing off the top, just like <makes a water crashing sound>…



I like that one. That was light coming down off the rock where the water was all swelling together, kind of like a whirlpool. I just wanted to get a good shot of how the different kind of current line and angles of water came together in between the rocks. I think the blurriness kind of looks cool. Its artistic with the white and brown color. There is a lot of movement in there.

Light

In many photographs light was used not only as a subject but also as an artistic element.

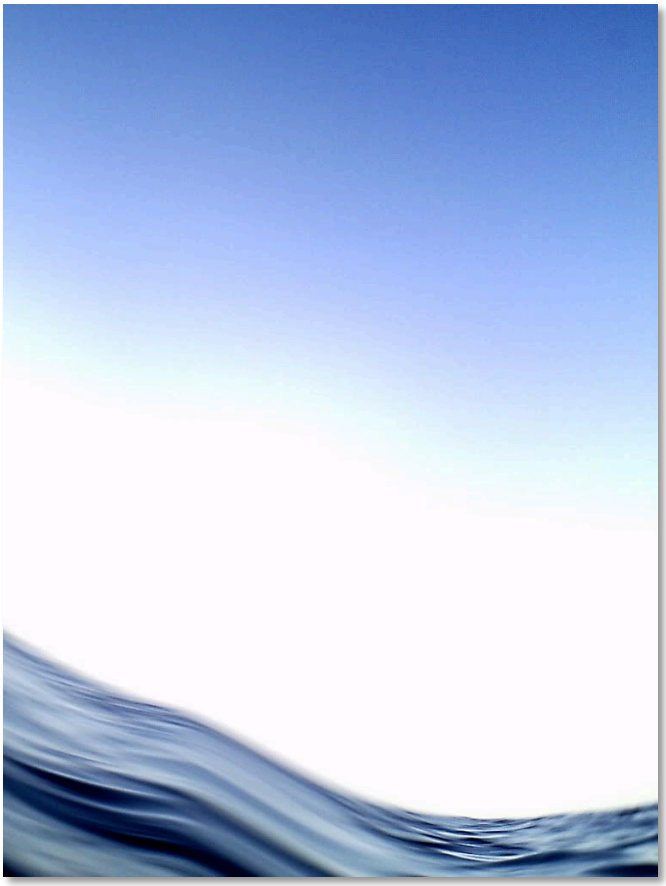
I kind of like this one. I think I was just getting out and I think I had a couple photos left. It was really shallow and I just took a picture of my foot, which wasn't very imaginative but I like the light in it as well. I like how the water shapes the light and its also kind of barren compared to the other ones.

Color

Participants discussed the color that came through their images.

It's my footprint in the sand. And it was really weird because I went up on the shore and some of the sand's black, totally black. But then the other sand's white, and they're sort of mixed in together. There's obviously some sort of minerals in the black sand combined with the normal beach sand so it's got that color to it, that grey. I just see the colors it's cool. It's just weird seeing a single footprint compared to like normally there's like tracks everywhere.

One participant was particularly taken by the transition from the color of the water to the color of the sky.



It was just kind of half in the water and half the sky. I was experimenting; just trying to get in the water angle going there, it worked out really well. I was just trying to get a bit of water and the sky as well because the sky was a pretty color. I think the most prominent artistic element is the transition of the color. How it goes into blue, then into white and then into darker blue. Its just simple.

Abstract

Some of the images were quite abstract and were commented on by the group during the group discussion. The photo below is one of those abstract images.

Affective Responses to Photos

Participants responded with mixed emotions when they looked over and discussed their photographs. Some pictures awoke frightening memories while others evoked feelings of peace.

Positive Emotion

Positive responses elicited from the photographs included excitement, pride, enjoyment, humor, and a sense of peace.

Excitement

People were generally excited when they captured a good image.

> *I guess I was pretty excited by it. Seeing that kind of scape and the fact that I could capture it as well and it's not as blurry.*

They were excited by artistic elements, such as color and light, in their pictures.

I'm pretty excited about this one. I love the colors, they don't stand out a lot. You seem to get that nice sort of ocean aqua and the fish seem so still, it worked. I love the light coming on to the sea grass, onto the yellows and coming out.

They were excited by artistic elements, such as color and light, in their pictures.

I'm pretty excited about this one. I love the colors, they don't stand out a lot. You seem to get that nice sort of ocean aqua and the fish seem so still, it worked. I love the light coming on to the sea grass, onto the yellows and coming out.

The thing that catches me about this picture is the light, that blaze at the bottom right hand corner. Just like a filtered view at the sun as it's going down, but its sort of really unusual to find it in the bottom right hand corner. It makes me feel <laughs> excited.

Pride

When people got clear and well-composed photographs, they were quite proud of their work.

That was the same theme as before, trying to get the waves, the same sort of surface meeting the rocks and what happens with all the bubbles and motion, little bit crazy. It's nice that some of it is in focus. I'm proud because I got a photo that looks alright.

Peaceful

Looking at the pictures had a calming effect on people.

> *Well I think as far as contrasting and stuff, I like this one. It's just peaceful, you know? And it's not too amazing, but it's just as it is. It's just – there it is, the ocean. It's not an amazing picture by any means.*
>
> *That it's quite a calm and relaxed place is what it looks like in this. I like the way you can see the light coming all the way through and there's just small fish but there's lots of them. Nice, I'm quite pleased with that one.*

Humor

Sometimes the participant found the subject of the picture humorous, as below with the shot of the mating sea hares.


This was such a unique thing to see, two of them together. I suspected they were doing a bit of lovemaking but obviously my interaction didn't quell any desires they had for each other! I find it really amusing...their perseverance was great! (Laughter) It's just such a really cool thing to see happening. Whenever you see two creatures that you don't get to witness...life!

Pleasure

Participants got a sense of pleasure at capturing a good photograph.

> *I'm quite pleased with the photo. When I was swimming I was quite excited because they were doing something different to what the other fish were doing and to find them in a kind of bunch like that was really interesting and I did manage to get a picture of them.*

> *Now that's nice! That's what I was looking for. We've got the forward, the back and the middle. That's very good for that camera quality.*

Negative Emotion

Negative emotions also emerged from the photoelicitation interviews. Mostly these feelings surrounded the taking of "bad" photographs. However, fear, at times, was a negative emotion elicited from the images.

Dislike of Photo

A common source of negative emotion was the photos that participants found somehow lacking.

> *Those were quite interesting fish but I don't like the photo because its quite dark and you can't see it.*
>
> *So if we go back a couple, that's rubbish, that's nice, that's rubbish, that's not too good but finding things, then realizing that if you want some sort of shot you need a foreground and background and something is going to come into focus. Its all a bit too random.*
>
> *This was just this morning at Gnarabup. That was really sandy, so there are not many good shots.*
>
> *That's nice that that's in focus, but it's really bad composition so I don't really like it.*

Out of focus pictures were a common source of annoyance, which, because of the inexpensive cameras that were used, occurred too frequently.

> *Out of focus, rubbish.*
>
> *It's a pity it's out of focus.*
>
> *It's an out of focus moving picture with camera shake of seaweed, so that's no good.*

Fear

This picture of fast moving fish reminded the photographer of the dangers of being in the ocean.

They were cruising past quite fast, you can tell that in the photo. Yeah, it sort of shows that, I don't know if they're going to hurt you, but in the last month I've seen two sharks, Blunties, when I've been surfing.

Summary

Subjects in photos were fish, water, landscapes, reflections, people, algae, light, waves, rocks, bubbles, other animals, surfing, and the reef.

Artistic elements were texture, painting qualities, movement, light, color, and abstract/painting qualities.

Many positive emotions arose from the photoelicitation process, including feelings of enjoyment, excitement, peace, humor, and pride.

Participants reacted positively to many of the images, especially those that were light and clear. Clear and colorful photos that included movement elicited feelings of enjoyment and excitement. Subjects that were humorous (bubble moustache, etc.) elicited positive emotions. Calm, colorful, and light-filled photos elicited feelings of peace. Photos that were clear and that captured the image the way that the participant wanted elicited feelings of pride.

Negative emotions also arose including fear and dismissal of 'poor' photographs.

The most common negative emotion encountered was the inadequacy that participants felt when they took pictures that they deemed to be too poor quality to discuss. Unfortunately, because the cameras often were not up to the task, people did take many blurry and over/underexposed images. However, conversely, some of these images were among the group's favorites because of their abstract feeling. In some instances photos aroused fear of the ocean that was associated either with an experience in the water or simply with the photograph itself.

4.4- Post SUYO! Awareness

Experience Based

New Observations

Participants saw many new things not only when they snorkeled and took photos but also when they looked at other participants' pictures.

Now that I've seen there is so much there…

Physical Feature

Many participants discovered physical features of both land and sea that they had not been previously aware of and recognized patterns in nature that they had not seen before.

For example, the reflection of the bottom of the sea on the surface of the water was a physical feature that generally went unnoticed until the photographs were examined.

This picture is out of focus but just looking at this top reflection is something I've never observed before. It is interesting.

The photo below captures a wave moving through a participant's feet while he was standing on a beach.

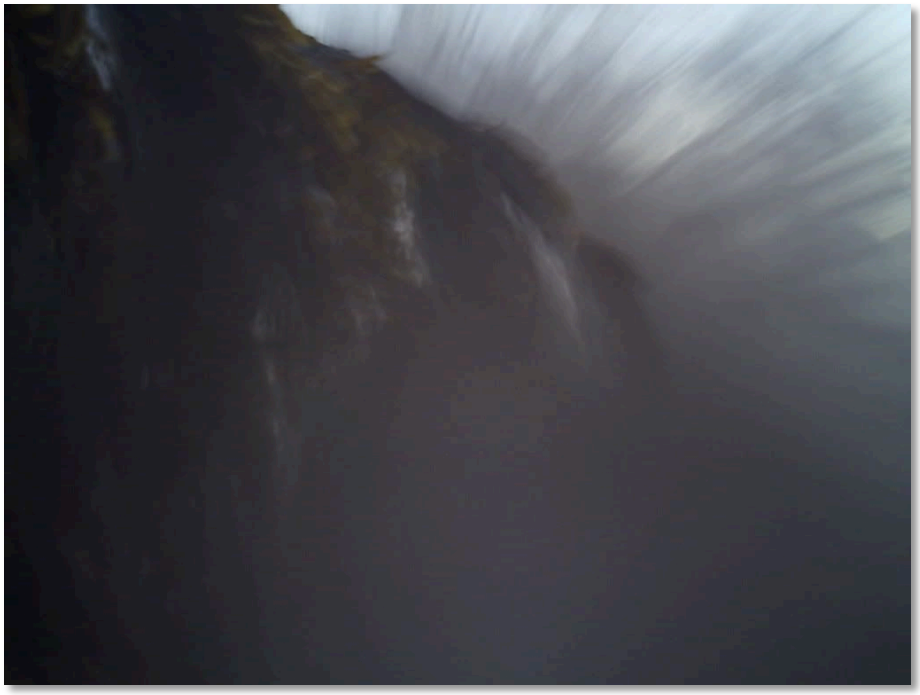
That was cool. That was just a wave coming, I was just taking the photo down, and a wave was just coming through my feet, and that's how it ended up. I've wondered about all the patterns that happen in nature that you don't see.

I love that it was just this brief second that no one would ever notice, but it was so beautiful to me. And that there are a million moments like that every second in the ocean I think. I think that's all I've got to say about that one.

By experiencing the physical qualities of the ocean while they were snorkeling and taking underwater photos, people came to understand how much the ocean moves and how changeable it is.

> *I learned how many forms the ocean can take*
>
> *I learned how much the movement of the ocean really makes a difference and also the different types of water.*

Experiencing the marine environment in the way that they did also reminded participants that the ocean is powerful and dangerous.



Don't stand in front of the reef when there's a five-foot wave coming to you. Because it can be dangerous. The ocean can be dangerous, it can take – it can give you life, but it can take your life.

Animals

Participants became more aware that the marine environment contains more life and more diversity of life than they had previously imagined.

> *There's a lot more fishes out there than I thought.*
>
> *There is a lot of life under the water around here.*

Although fish were the most common animal that participants saw and discussed, they did come across other animals that they were able to photograph.

> *This time around I've sort of thought more about those things that aren't fish, you know?*

One of the participants was excited to find a number of sea urchin tests in proximity to one another.

It was just so interesting; I had never seen that before, all the sea urchins together like that. I found it really fascinating how they were herded into one area it was just such a unique thing to see.

Another participant remarked on a new coral that she had never seen.

> *I had never really seen that coral, it was really almost like a mold coming through.*

Sea hares were among the most interesting creatures that the participants encountered.

Ah! So I accidently stepped on this. I was about to line up to do a barnacle shot and I accidently stepped on this thing which scared the bejesus out of me it was so scary. I probably have seen one but was like, great! Its such and interesting creature and I was just a bit surprised to see it down there because a lot of what I took photos of were the static non-living things and to have something that was living...Wow!

People were surprised by the abundance of fish that they discovered.

> *I was quite surprised at how many fish there were actually when I first went down.*
>
> *There's a lot more fishes out there than I thought.*

There were more fish there than I thought, I think. I have the kind of impression that there aren't that many fish around and sometimes I go snorkeling and there aren't that many fish around. I think this was the second day I went, the first day I didn't see many, even though Dave said he saw lots. The second day I saw a lot more.

Again, a picture of small fry. We were quite lucky we were over at Meelup here and that particular one is interesting because we snorkel there quite a bit and this is probably the most prolific we've seen that numbers of fish.

One participant witnessed a fish behavior that she had never before seen.

I'm quite pleased with the photo. When I was swimming I was quite excited because they were doing something different to what the other fish were doing (feeding) and to find them in a kind of bunch like that was really interesting and I did manage to get a picture of them.

And the animals that they saw were not confined to the sea.

I quite like that. This cormorant was sitting all the time that we were swimming around. It sat on top of the rock watching us and presumably watching the fish as well. That was quite nice, we went back a week later and he was there again, sitting in the same place. Might have been a different one I guess but this was just a photo putting it in context showing what it was like outside the water, my mask had almost filled up and I wasn't doing very well under the water so I thought I'd have a go out of the water, I quite like it.

Distribution of Life

A participant was on the one hand surprised by the dearth of life that she found in a place where she had expected to see an abundance of life.

> *I think in the aquarium (snorkeling spot), I've been snorkeling in there my whole life and for me this time it seemed that there was not that much life in there.*

On the other hand she was impressed by the amount of life where she thought little would exist.

I always thought there was a lot more life in there (the aquarium) whereas in the lagoon, the more I looked around the more I saw things happening. There was that learning aspect as well.

Human Impacts

One person in particular commented on human impacts underneath the water's surface.

I was diving at the jetty before in Busselton, and there's so much rubbish down there. There are building signs from the construction. I really wanted to go there, so Jo and I went to go snorkeling there the other day but it was just too murky. You couldn't even see anything. I would have really liked to have gone down there and just taken a picture of these construction signs underneath the water.

Summary

Through their photography participants became aware of the ocean's physical features, such as texture and patterns that they had never before noticed. While they were snorkeling, they saw invertebrates, fish, and other life that they had never before seen. In addition they observed the distribution of life in different parts of the ocean and began to recognize human impacts under the water. They became aware of the biodiversity in the ocean and the sheer amount of life that exists under the surface**.** By direct experience, their own photos, and looking at others photos, participants began to realize how many different forms the ocean can take and how water shapes the underwater world.

Knowledge Based

This theme explores the knowledge that people gained or remembered from participating in the photoelicitation program.

New Knowledge

Although increasing knowledge was not specifically targeted as an outcome for the program, such an increase occurred organically. During the program, participants learned about photography and learned to look at their photos critically with an artistic eye. In addition, they gained new insights from sharing their knowledge with the rest of the group.

How To Use Camera

Participants learned to use the camera both in and out of the water. Although most had never operated an underwater camera before, they caught on to it quickly because the controls are fairly straightforward. However, a major limitation of the camera is that its screen is so small that participants could not determine the quality of their shots while they were in the water. This determination could be made only after the images were downloaded.

There was the learning of how to use the camera. That aspect of it, trial and error and the photography side of things.

Great learning about the camera.

Experimentation with the camera and the limitations

Photographic Techniques

Although they were briefed verbally on how best to use light, many forgot this lesson while they were snorkeling because they became distracted by what they saw underwater. It was only through their direct experience with the camera that they learned to use light effectively.

Given the time I probably would have tried to get more direct light shots.

I just learnt a lot about, obviously the light, just lighting with taking the photos, just learnt about how to use that, and think about that.

Learning to work with the light and the sun I think was a new learning experience.

It also took time for participants to determine the kinds of subjects that they wanted to photograph. At first many would take random photos rather than actually thinking about what would make a good subject. However, as they became more accustomed to the process, many started seeking out the subjects that they wanted to photograph.

I focused on picking out the subject matter of what's going to look cool for the shot.

It's a learning curve when you are using anything like that (new cameras). Probably if I did some more than I would improve and look for better subjects. Once you start picking out favorites here and you see what works and what doesn't work.

Going on multiple excursions was helpful for participants. After reviewing their initial photos, they were able to see ways in which they could correct any deficiencies in their execution. With practice, people began to improve their photographic technique.

When I was going through the first ones that I did I was assessing what I did that worked and what didn't work. A lot of it didn't work but I started to formulate in my head the next time I went out, what I would think would be more interesting than what I had taken. I would be able to maybe get something more interesting that what I already had and also trying to minimize the out of focus stuff.

Artistic Elements

Prior to the workshop, most participants did not know how to create or examine photographs artistically. This experience provided them a rudimentary lesson in that technique. Along with increased knowledge about the marine environment, they gained some of the artist's perspective.

I learnt about movement and light

Learning about composition

Remembered Old Knowledge

By participating in a direct experience with the marine environment that included photography, people remembered things they had learned about the ocean and then forgotten.

I re-learned the beauty of ocean

To not just stand in front of the reef when there's a five-foot wave coming to you, because it can be dangerous. The ocean can be dangerous, it can take – it can give you life, but it can take your life.

Summary

Knowledge gained was related more to skills than to factual information: Participants learned how to use their equipment (cameras) and learned how to take better photographs. After the interviews and the workshop, they learned more about the composition and artistic analysis of photographs. They also remembered that the marine environment is a vibrant, beautiful place but that because it can be dangerous, respect and caution are needed when interacting with the ocean.

4.5- Post SUYO! Perspectives

A major theme that emerged from the data analysis was that participants gained new perspectives on the ocean through both direct interaction and the sharing of pictures and experiences.

New Perspectives

This section describes new perspectives that participants gained about the ocean. These new perspectives came from examining their own photography, sharing their photographs with other participants, and looking at and discussing other participants' photographs.

Perspectives on the Ocean

After competing the workshop, participants often found that their perceptions of the ocean had expanded. Through their underwater photography, people had gained new ways of viewing the ocean.

> *Keep looking at it in different ways*
>
> *It actually sort of made me open my mind to what's going on, other than just trying to catch waves sort of thing. Like look at the environment and say 'Wow, that's awesome,' just really nice.*

In this case, the participant looked at the ocean in more detail.

> *It was great to have a camera there to take photos. It makes you look at the ocean with a lot more detail, looking at the smaller things. Its not like you are just skimming over and saying there's a fish and there's that. You are a lot more discerning about what you are seeing. That was really exciting, to just get lost.*

Some people, looking at places that they had previously visited, saw things from a new environmental perspective.

> *You learn to look at different things in the ocean. Some of the locations were places I've snorkeled all my life and I saw the changes, and noticed the differences in those places as well, from an environmental viewpoint.*

Participants reflected on the way in which the technique exposes people to different perspectives on the ocean and how beneficial these new perspectives would be for those who do not interact with the ocean frequently.

> *I think it would open up people's minds that don't experience the ocean as much as some of us. Making them get into the water, and getting them to look at it in a different perspective would be awesome.*

Snorkeling and photography allowed people to get a more intimate perspective on marine life.

> *You get a feeling of being closer and kind of surrounded by the fish more and being more a part of their environment.*

And being in the ocean encouraged people to reflect on their own perspectives about life.

I really enjoyed just sitting there as the sun was setting, watching the patterns that the water made as it ran back to the sea. It made me think about peoples' journeys that they make back to themselves, in the ocean. And I've sort of thought – that seemed to encapsulate that feeling for me, that photo. And it was just beautiful, it was a beautiful moment at sunset.

Group Sharing

Sharing photographs and experiences as a group allowed participants to gain additional perspectives about the ocean.

I realized other people's perspectives.

Good pictures all around. I enjoyed everyone's different perspectives

Enjoyed looking at other people's perspective of the ocean.

Participants realized that people could have very different feelings or views about the same thing.

It's made me realize how different we all are and how people's perception of the same thing can be so different

Yes, other people's views interesting. Diverse reactions, Enjoyed everyone's pictures.

Participants were interested in learning what others thought about their pictures.

I got to learn what people thought about my pictures

Good to see what others saw in my pictures. Loved seeing others' photos- for many different ways to photograph the ocean and so many different perspectives. Was very cool.

Participants enjoyed the fact that people saw things differently and that these different perspectives were reflected in their pictures.

It will make me look at the ocean in detail. Looking at others' photos gives a different perspective on the ocean- a different way of looking at it

Wow. The pictures blown up were awesome. The difference in people's photos and then the way they saw it in their eyes was cool. Each beautiful in their own way

Amazing to look at others pictures. Good to see different angles

People learned about different peoples' techniques and styles of photography.

Very good to share the experience & the efforts of others. Quite interesting to see other's results and different 'styles'. Happy to do more. Very good. Thanks.

Two friends discussed sharing pictures prior to the workshop.

I've already had Belinda look at a few of them and she liked it. She gave me a different view on a couple of them. So this one here I liked and we talked about it a lot more and she talked about the texture of it as well. She enjoyed that perspective of it.

No New Perspectives on Their Photos

A few participants were not influenced by others' perspectives on their photos.

I think people had similar views to my picture as I did so I don't think my view changed

Didn't change my view of my picture

Connection to Others

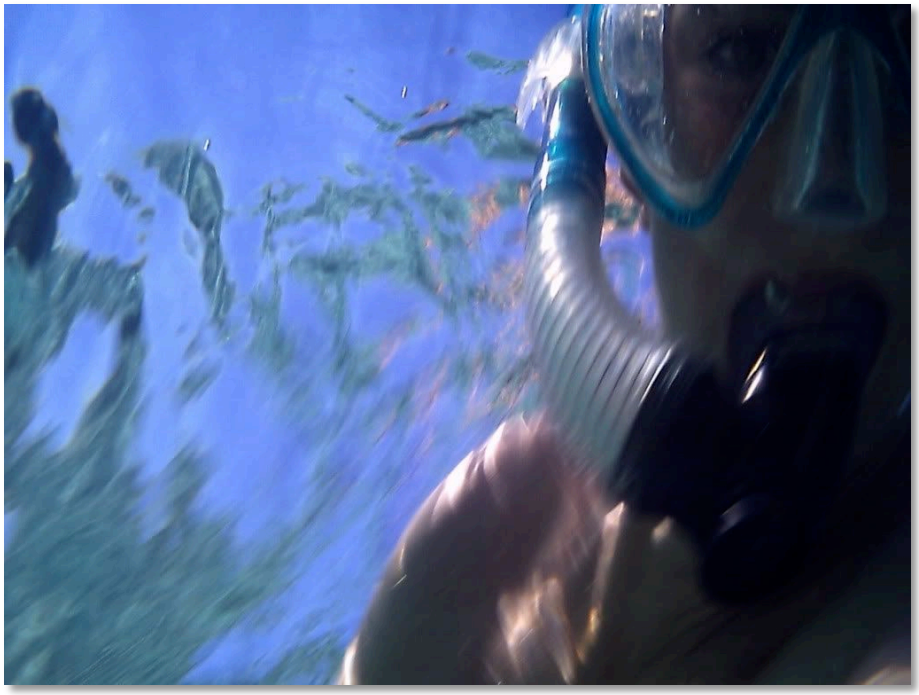
Many participants described sharing the ocean experience with other people. This connection through a common experience helped friends bond.

This picture represents the connection between surfing together.

I think it encapsulated the moment, which was just me and my buddy, having a surf, There were only two of us out there. It was really dark and cloudy, but the water was really warm. You can see this front section, that's my board there, and I was just sitting on the other side of my board. It it's that connection between mates through a shared passion. I love that, sitting out and being in the ocean, and being with your buddy. But we didn't really say anything. You know, that connection that you have with your mates and the ocean, and the surfing. It was really sweet.

Participants also enjoyed connecting to others through the workshop and sharing their photographs, perspectives, and experiences.

> *It was very good to share the experience & the efforts of others. Quite interesting to see other's results and different 'styles'. Happy to do more. Very good. Thanks."*



One of the participants used the opportunity to take her niece and nephew snorkeling. The picture above is of her nephew in the water.

Summary

Participants often expressed satisfaction with the ways in which they represented their experiences. In addition, when they looked at and discussed their photographs as a group, they gained new perspectives on the ocean. During the photoelicitation interviews, participants noticed things in their pictures that they had not seen while snorkeling. Sometimes the exercise as a whole caused people to feel more intimately connected to the marine life.

Each person brought her or his unique perspective and photographic eye to the process, that, when shared, expanded participants' ways of thinking about the ocean. Perhaps most interestingly, during the group-sharing people who initially had negative reactions to their own photos were surprised to see that the group often responded positively to them.

Taking pictures taught participants to look at the environment from a more artistic perspective. While snorkeling, instead of looking around randomly, they

actively sought out good photo opportunities and in so doing discovered new things about the ocean.

Connection to others was a common theme that emerged from the photoelicitation process. People enjoyed sharing the pictures that they took of friends engaging in water-based activities.

4.6- Post SUYO! Intended Behavior Change

One of the goals for the program was to ascertain if it encouraged people to change their future interactions with the ocean. Discussions of this possibility centered on four themes: more photography, more time in the ocean, increased stewardship, and more exploration.

More Photography

Many participants were motivated to do more underwater photography.

I think it has made me want to do a lot more photography

I think it has made me want to do a lot more photography and exploring above and below water. This has always been a passion of mine but unfortunately sometimes you need a reason like this to actually do it

Possibly venture farther, deeper and with better kits

One participant even remarked that he might prefer taking photos to fishing.

May be even that I'd rather take photos from than go fishing

People also expressed an interest in purchasing their own gear.

I'd like to spend five grand on a decent underwater camera now.

I definitely want to do more of it. Get myself like a half decent camera, something you can actually use underwater, because I like taking land pictures. With the water it was just amazing, hey.

I actually was talking to a mate the other day who is in Byron, she's a photographer, and I was asking her about how to get a camera cheaply, or get housing or something for my camera

More Time In the Ocean

After participating in the workshop, many participants wanted to interact more often with the ocean.

I will plan on spending more time at the ocean during the winter pursing new hobbies

I will make an effort to be under the water more often, not just on top of it!

Yes, I will go swimming in the ocean more often

I think I've learnt to just get out there more and look more, instead of just sometimes you go out and you just surf or whatever, and you're not really taking in everything. And it's good to look below the surface and see what's going on.

Increased Stewardship

Participants expressed concern for the health of the ocean and voiced a desire to be more active in caring for the marine environment.

I think I had a lot more ideas in mind that I wanted to investigate in terms of looking after the ocean. I'd like to probably do that a little bit more.

Maybe I could pick up rubbish, that's something I could improve on. You see stuff down there and you could clear up a bit more. I always clear up my own mess, but maybe think engaging the community and everyone helping out and making things better. That could be a way I could improve."

I will look after the ocean more and save it

More Exploration

People developed a strong desire to explore the marine environment to a greater extent. They also expressed a shift in perception, learning to observe things more closely when they were interacting with the ocean.

I think I've learnt to get out there more and look more, instead of sometimes you go out and you just surf or whatever, and you're not really taking in everything. And it's good to look below the surface and see what's going on.

I want to go and find sea urchins and sea hares and get big prints of some of my pictures

It actually made it sort of open my mind to what's going on, other than just trying to catch waves sort of thing. Like look at the environment and say 'Wow, that's awesome,' just really nice.

Ill just probably observe a lot more, take my snorkel and goggles a lot more and say hello little fishies like I normally do. At least I could see them now. I've been swimming in a couple of these spots quite often and I've never had a look under the water.

Having the cameras while snorkeling encouraged the participants to slow down and be more aware of their environment.

I learned to take time in surroundings

Summary

Do More Photography

Although behavior change was not specifically assessed longitudinally, the groups did discuss how they intended to change their behavior. After participating in the program, many people wanted to become more involved in photography, and some expressed a desire to get more advanced underwater camera gear. One participant even began thinking about taking photos rather than going fishing

Explore More

As a result of their experiences, participants also wanted to spend more time in the ocean. They were enthusiastic about exploring the ocean again with a camera, whose use slowed them down and encouraged them to see the environment in new ways.

Increased Stewardship

Additionally, in a hopeful development, some participants averred that the program influenced them to treat the ocean with more respect. Because the processes of exploration and photography caused them to focus more intently on their surroundings, some people became aware of human impacts, including rubbish that might have previously gone unnoticed.

4.7- Program Feedback

After the program was completed, participants were asked for feedback on their experiences. During these discussions most described the program as enjoyable and motivating and expressed their pleasure at the quality of the images that were

produced. Nevertheless, they did not hesitate to offer their suggestions for improvement.

The Value of First-Hand Experience

People agreed that first-hand experience in the ocean is an extremely valuable learning tool.

> *The program gets you personally involved and makes it relevant to you. Makes your experience seem important. Having other people look at your photos makes you want to take good photos.*

> *Its great to get people out there looking at the ocean, experiencing so many different things. It would be great to get people who don't live so close to the ocean too, to do it.*

When asked about using this program in schools, participants discussed both how much they value hands-on learning and how this program exemplifies that technique.

> *I believe that hands on learning is always good*

> *Always good to do hands on with kids and get them to review works. Great learning tool*

> *The program is very useful, interactive, vital for educating the future.*

Statements About Motivation

Participants commented that having underwater cameras and being part of a structured program motivated them to get into the ocean and snorkel.

I think it provides more meaning, more like I can belong in there as well. I've been a snorkeler before but, you forget and you stop doing it, you can't be bothered and you lose interest because you've seen the stuff, whatever. So you feel like you, I hate the word, but have done it. But this gave that rejuvenation again into that and I think what it brought back was the appreciation of what is there. It's so diverse and it's not in your face because you can't see it most of the time. When you have your polarized sunglasses on you think aw, a beautiful clear day, the ocean looks beautiful but you don't really see how alive it is.

I've got a camera I take out sometimes too, but it was good to just be a bit more structured. Yep, take out your camera, take some photos. And you're committed to doing it because I guess with your own one, I always forget to bring it.

A bit of an excuse to get out, gives you a point of reason to go as well

It made me go out a lot more than I would normally.

Having a camera helped participants focus while they were snorkeling.

I don't know it's kind of like you need something to focus on while underwater.

Having a camera allowed participants to record all the wonderful things that they saw underwater.

It was great because so often when you are snorkeling around and you are under the water seeing all these cool things that you wish you had a camera just to capture whether its looking through a cave or checking out a fish under a little ledge, depending on the time of the day. Interesting though, it's another trip so you are seeing different marine animals and fauna.

Statements About Enjoyment

One of the most common statements about the program was that it was a lot of fun!

I really enjoyed it- thank you

Yeah it was really fun, I had heaps of fun with it. I only got to take it out twice, I would have liked to have taken it out more and gotten way more photos. It was awesome, just loving being out there, and being able to just take photos as I wanted.

Yeah, it's been great fun. I really enjoyed just having a different way to connect with the ocean.

Advice on Program Improvement

There was a lot of feedback regarding the way in which the program was structured with people indicating how I could improve the experience.

Time Issues

Some participants struggled with the time allotted.

Last session was fun but seemed to go on a long time

Because participants had to learn how to use the camera, some felt that they needed more time to become proficient.

More time to get to know the camera might be good.

Others who waited to the last minute to go snorkeling and therefore rushed the process reflected on this circumstance.

It was rush on my behalf; I need to take time next session

Time in the ocean was a little limited- getting into bad weather might limit the chance to get photos

I was probably a little bit slacker this time. <laughs> Circumstances were different, so I didn't have as much time to go and seek out.

Others were quite happy with the amount of time allotted.

I don't think we need a shorter program. I thought it was happening last week and I sort of started to panic because I hadn't really had a chance to go out and its good to have had a bit of time to experiment with the photos

How to Improve Photography

People described how they thought they could improve their photography.

I could always improve my photography, just by taking more photos. It's also important to frame them, and I'd love to take more, and just using the natural light as well.

The good thing was that everyone had the same camera, the same thing, so they were using the same thing. And I mean, obviously I'd like to have a better camera, and maybe good housing, and really get into that side of things.

Schools Advice

People talked about the potential for the program to be implemented in local schools.

It would be very useful, interactive, and vital for educating the future.

I think it would be amazing, there is so much that could be taught from this type of learning experience. It's out of the classroom, interactive, real. Gives them ownership of the pictures (what they choose to shoot) marries well with classroom learning. Team building as well.

I was thinking about that a lot as to how you could adapt that to the classroom situation. I think it would make them a lot more aware. I think

you might have to have a couple sessions with the kids especially getting used to the cameras, it takes a bit of time to get them used to these specific cameras. As you say, the cameras will probably improve and it will be a lot easier.

One person suggested that running the program over a longer time period would allow participants to track changes in the environment.

I was thinking that you should take the same group of kids over a long period of time. To check out the same environment in year 8, 9 and 10 and to try and track the changes in the environment. That's obviously from an S&E point but there's always the science side of things as well.

Participants thought that the program could be used in both biological/science and arts-based curricula.

I like the focus on the artistic side of things as well, which I didn't really think about too much. I was sort of more focused on the sustainability side of things because I knew it was part of your SME project. However you could use it for that cross media SME, that side of things, taking the artistic side of things, it's not all about capturing a fish.

I think all kids studying biology and science just in general. And they all do swimming lessons, so it's a good way of especially understanding not touching things and not collect.

Online Sharing

Some feedback related to the potential of the program to incorporate online sharing of the images.

Being able to share photos would be good. Can you put them on a web album, e.g.- Picasa or flicker?

Equipment Issues

Some participants had problems using the equipment, the biggest being that because the camera's memory card was small, they were limited in the number of pictures that they could take. (This problem was rectified by putting a bigger memory card in the camera.)

> *You have thirty frames to work with and you need to click away and it's quite difficult to know if the camera is on or off. With a bigger card on there you could stay out longer. I guess we had to stop when we were finding things that would be really quite good to photography afterwards, but it was a bit too late then.*

> *(Photos were) better once got used to camera, would have been good to have card so could take more.*

The limited space on the memory card had the positive effect of making some people more selective about the pictures that they took.

> *The only annoying thing was that it only gave me such a limited amount of photos, like 10 photos or 13 max. That was the only thing. But on the other hand, it also made me be a bit more selective. If I could see, because it's really hard to actually see into the camera, if I could see it was not a good picture, I'd look back over them and delete anything that wasn't worthwhile.*

The screen on the camera was also difficult to see because of its size and brightness.

> *Sometimes it was a bit glary and a little hard to see the screen on the camera. Also, sometimes the camera would turn itself off while I was sort of in the middle of doing a shoot. I'd take a couple of photos, come in and have a look. So it was sort of, like with everything, just getting to know your equipment.*

Summary

Participants strongly believed that the ocean is a very good learning environment and that direct experience in the ocean is important for students with the marine environment. In other words, they believed that hands-on learning is effective for environmental education.

Giving cameras to potential snorkelers and making their use mandatory encouraged participants to explore the ocean. Many said that they probably would have lacked the motivation to snorkel if they had not had a camera and if they had not been part of a program. Even when they procrastinated, they felt obliged to take photos.

A major recurring theme was participants' enjoyment of the program. They did not feel as if they were being forced to do something that they did not find interesting. They had a great time exploring, taking photos, and sharing these photos with the rest of the group. The fact that this program is enjoyable is especially important for using it at the school level. Holding the interest of young people is much easier if they are having fun as they learn.

Although people were impressed by the quality of the images that the camera provided, they were disappointed that the memory card was relatively small. Responding to this concern, I supplied larger cards to the subsequent group, which comprised high school students.

Chapter 5- Student Themes

5.1- Introduction

> *I see the ocean differently because now when I see something beautiful, I ask myself why I think that.*

This quotation is fascinating because it demonstrates that the speaker had actually begun processing information differently after participating in the workshop. Taking underwater photographs and discussing those photographs with her peers has her engaging in self-reflection about the way in which she views the world.

This section describes the themes that emerged from the student qualitative data: pre-module questionnaires, student workbooks, student power points, student group interviews, and class discussions. Core themes that emerged from the data were related to direct ocean experience, awareness, knowledge, beliefs, affect, photo attributes, perspectives, intended behavior change, and program feedback.

5.2- Direct Ocean Experience

This core theme relates to the direct experiences that students have had in the ocean, both prior to and after the Show Us Your Ocean program. Before the workshops began, students were asked to recall their previous experiences with the ocean. When they completed the program, they reflected on the new behaviors and skills that they had acquired from snorkeling and photographing the marine environment.

Important Memories Pre-SUYO!

First Memories

Students were asked to reflect on their earliest memories of the ocean. Although most of the remembered experiences were positive, a few were traumatic.

Waves, which were a prominent feature in their memories, were recalled as being powerful.

> *4 years old. We just moved down to Busselton and remember Meelup at dusk. The waves seemed really big back then.*

Many also had general memories of playing at the beach.

> *I have been going to the beach as far back as I can remember.*

Swimming, snorkeling, and surfing were also part of their earliest memories.

> *From memory it was when I was 7 years old and first when snorkeling in Geraldton.*

Frightening experiences of near drownings were also recalled.

> *I almost drowned fishing & my friends saved me.*
>
> *I got dumped on my boogie boarding and almost drowned.*
>
> *I was swimming in the Swan River, and I almost drowned.*

Students remembered fishing with family members.

> *When I was two, I caught a flounder from Woodman's Point.*

Some students' earliest memories were of being on boats.

> *I remember taking the boat down to Augusta and going in the river.*

Formative Memories

Students were asked to reflect on their formative memories of the ocean—that is, those memories that made a lasting impression on them.

One student gained more respect for the ocean when he was in India and witnessed the rivers full of garbage.

> *I got more respect for it being in India and witnessing the rivers full of garbage*

Traumatic experiences while swimming were also common formative memories for students.

> *Yes, when I was little, I got dumped, I was so scared. But now I like the ocean but not waves.*
>
> *I got stuck in a rip when I was five. I almost died. Pretty ghastly dude.*

First-time surfing experiences, both positive and negative, were significant memories.

> *I was first learning to body board when I was six years old. I was dunked repetitively and pushed around by the waves. It made me realize how indifferent and dangerous the ocean can be.*
>
> *When I caught my first wave I felt that it should never change.*

One student recalled snorkeling for the first time and how that experience made him realize the vastness of the ocean.

When I first snorkeled on a reef, I felt a lot smaller in the ocean.

One student recalled being on the ferry going to Rottnest Island when a rogue wave hit the boat.

Early memories of fishing were also formative experiences for students.

> *[t]he first time we went fishing we caught the best fish. I helped and got my own fish.*

Growing up next to and hanging out at the beach was formative for one of the students.

> *I grew up at our beach house in Mandurah, and so I spent most of my time everyday at the beach.*

Favorite Activities Pre-SUYO!

Just visiting the beach was one of the most common ocean-based activities for students. Sometimes they would build sandcastles, look for seashells, or explore and comb the beach. Some students loved swimming and snorkeling while others enjoyed scuba diving. Fishing was also an activity that the students often enjoyed.

Some students had previously interacted with the ocean quite a bit, while others had never gone in the ocean before. The former group frequently fished, surfed, and snorkeled. The ocean was a relaxing where they could have fun, go for an adventure, and spend time with friends.

> *The ocean is a place where I can go to have fun, catch food, have an adventure, go sailing, and just sit and mellow out, with or without friends.*

New Activities Experienced During SUYO!

Students reflected on the new activities that they had while participating in the SUYO! program.

Underwater Photography

Underwater photography was a new experience for most students— something that was exciting and different from their normal day-to-day activities.

I've experienced snorkeling for the first time as well as using underwater cameras J

I have not done underwater photography in the ocean, so that was new!

Like taking photos. I've never done that underwater before. It was really good.

Photography gave some students something interesting to do while they were under water.

When you're snorkeling usually you sort of just swim around. But if you're under there and you've got something to do, it's more enjoyable.

We weren't just snorkeling around looking at each other. We had something to do.

One student uploaded an underwater video to Facebook in order to share it with friends.

We took a video when we were diving and I put it on Facebook and then everyone who asked me how it was, they can just go to my Facebook. It's excellent.

Snorkeling

For many students, snorkeling itself was a new experience.

> *I've experienced snorkeling for the first time as well as using underwater cameras.*
>
> *I haven't snorkeled in the ocean before.*
>
> *After this activity I have experienced many new things like snorkeling and the use of underwater cameras.*
>
> *I went snorkeling for the first time, took underwater photos for the first time.*

Exploration

Snorkeling and having a camera motivated students to explore under water more than they normally would.

> *We went to new places as well, you know. Like Robins Jetty, I've never snorkeled that before.*
>
> *Yes, the snorkeling was the best part about it as well as going to new locations that I haven't been to before.*
>
> *Yeah, I went and explored more because I had the camera with me. So I went down more than I normally would.*

Students reflected on their exploration of the reef environment.

> *Going through the tunnel underwater was my favorite experience underwater.*
>
> *I got to experience snorkeling, fish up close and I got to see the drop off.*

Snorkeling on a shipwreck was new for most of the students.

> *I have visited my first shipwreck while snorkeling. I have also used an underwater camera for the first time.*
>
> *I had never been snorkeling at a shipwreck before, so that was new. It was really interesting and there were lots of different fish around.*
>
> *It was awesome seeing the sunken ship.*

Interactions with Wildlife

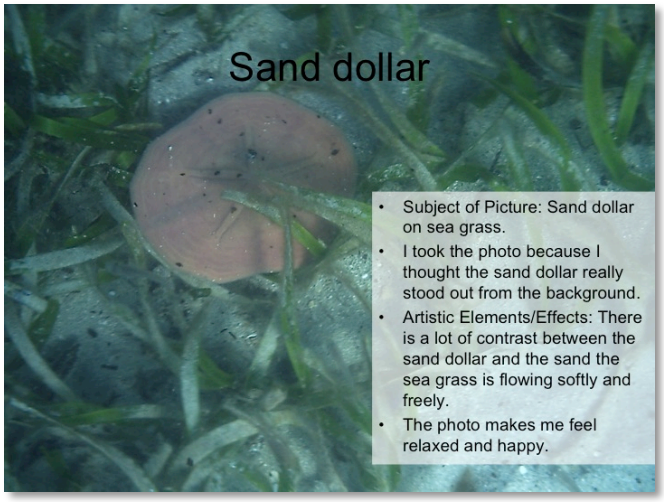
For many students, the field trips presented opportunities to interact closely with marine life.

> *I got to experience snorkeling and fish up close.*
>
> *I've had the chance to get as close as I did to marine animals.*

Some students recalled being stung by jellyfish on one of the fieldtrips.

> *I remember multiple jellyfish stings.*

Finding new marine organisms such as sand dollars excited the students.



I remember finding a sand dollar.

New Skills Learned During SUYO!

One of the prerequisites for permitting the SUYO! program in schools was that students had to gain or improve critical ocean/swimming/snorkeling skills. That the program successfully reached this goal is demonstrated in student comments.

I have more confidence with my swimming and snorkeling

The program reinforced the importance of working together and taught the participants safety rules associated with ocean-based activities.

We learned how to work in a group together, safety rules, and how to snorkel.

They also learned how to deal with marine hazards such as jellyfish stings.

We learned how to snorkel, how to deal with jellyfish stings and how to swim over shipwrecks.

Affective Reactions To Direct Ocean Experience

Students discussed how they felt about their SUYO! experiences snorkeling in the ocean.

Positive

Students enjoyed being out of the classroom and discussed how much fun they had playing and interacting in the ocean.

Relaxation and Play

For many students the ocean is a place of relaxation and play.

The ocean is my playground brah.

A great place to have fun

Having Fun

My favorite part was actually snorkeling. The reefs were amazing! They are something you don't expect to see when in the ocean.

I had lots of fun. I enjoyed the snorkeling the most. I would definitely do it again.

My favorite part was the snorkeling in the ocean with my friends. I enjoyed taking the underwater photos.

Negative

Some negative emotions also arose from the experiences the students had in the ocean during SUYO.

Dislike and Hatred

The majority of these emotions resulted from encounters with a swarm of jellyfish that stung many of the South Fremantle students. During the group sharing, participants discussed a picture one of the students had taken during the jellyfish experience.

What subject is in this one?

Jellyfish. They're evil; all jellyfish are evil.

So what are your feelings from this picture?

I hate it.

Ouch.

You've got to run away. Or swim.

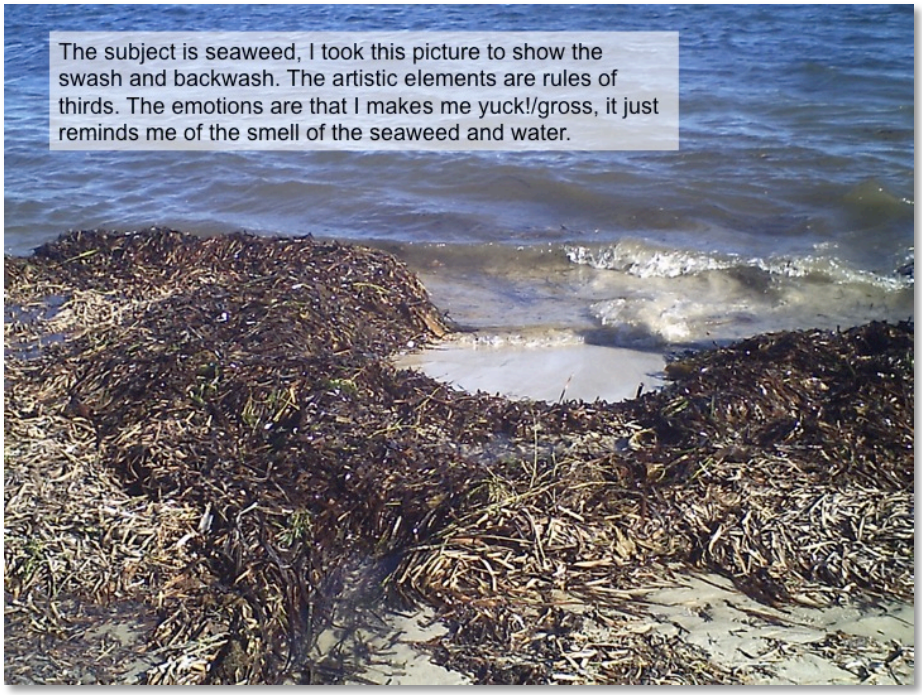
But I hate jellyfish now.

They don't even have brains.

All jellyfish are evil.

Discomfort

Taken by a Comet Bay student, this photo of rotting seaweed reminded the class of how the beach had smelled that day and how they had reacted to it.



I feel lost.

Like turning around and walking off. It makes me feel like vomiting.

Not as inviting is it?

It actually looks like porridge swamp water at the start of the bottom right corner.

It looks dark. Apparently it stunk as well.

It did.

Yeah it didn't smell the best.

There's a lot of weed in there, isn't there?

[Joking] Declan threw up.

It doesn't look nice.

Summary

Students described their earliest, formative memories of the sea. Some of the memories were quite traumatic, involving massive waves and near drownings. These students experienced the power of the ocean when they were young. Other, less intense memories involved hanging out on the beach, fishing, and surfing. One student recalled his trip to India and the amount of garbage he saw in the rivers there.

Favorite activities that many had participated in during the past ranged from surfing and swimming to just hanging out on the beach. Underwater photography was a new activity for most students. While they were underwater, photography gave them something to concentrate on. Many mentioned that being instructed to take pictures helped them to focus on their surroundings and motivated them to explore more because they wanted to capture interesting scenes.

A student uploaded one of his videos to Facebook. That he did so is exciting because students were not directly instructed to share their underwater experiences with a wider social network. Social network sharing of direct experience in the ocean may have potentially large impacts on increasing young people's awareness of the marine environment.

I was surprised to learn that snorkeling was also new to many of the students involved in the SUYO! program. Because Perth is a coastal city, I had assumed that most students would have had prior snorkeling experience. Students were excited to engage in this new activity, which they all enjoyed.

Other students got to experience underwater environments that they had previously not visited—for example, reefs, underwater tunnels, and shipwrecks. They enjoyed exploring these places and encountering animals that they had never before seen. Students also remarked on their pleasure in seeing fish and sand dollars close up and at the discomfort of being stung by jellyfish.

Students also gained new skills such as swimming and snorkeling and improved their ability to work together. In addition they learned and practiced outdoor safety skills. When jellyfish stung members of one class, students used their first aid knowledge to respond.

Students also got a chance to describe how they felt about their direct interactions in the ocean. While mostly positive, experiences such as the jellyfish encounter and the rotting seaweed evoked negative responses.

5.3- Personal Connections To The Marine Environment

Students were able to describe their sense of their connection to the marine environment.

Spiritual Connections

Students stated that when they interacted with the ocean, they felt a part of something special that is bigger than themselves.

> *The ocean is uncontrollable, when you swim in it you feel like you are part of something bigger than yourself.*
>
> *When outside the water you don't realize how many different organisms there are in the ocean, but when inside I feel free like I belong to something special.*

Students felt a sense of connection between themselves as individuals and the ocean and its inhabitants.

> *I felt a connection with my environment and felt at peace with the creatures.*

After snorkeling and interacting with wildlife, students felt a stronger connection to marine animals.

> *I have a stronger connection because I have a better understanding of the ocean and the animals its home to.*

I feel very close to the wildlife and think further into evolution.

Because she had previously spent time at the ocean, one student had strong connects to the marine environment.

I feel very connected to it because I'm at the ocean every weekend.

A Place to Escape

One student wrote that the ocean is a place to escape from his life on land.

The ocean is my life. It's a place of beauty where I can escape too. Without it, I don't know what I would do.

Emotional Connections

Students described their emotional connections that they had toward the ocean. Most emotional connections described were positive.

Felt Refreshed

They also appreciated the ocean's ability to refresh them.

The ocean's fish and different fort of plants are beautiful and the ocean is refreshing when going swimming on a very hot day

Felt Cautious

Some students exhibited caution about entering the ocean.

I feel safe, but I am cautious about all dangers.

Felt Connected

Some students had lived near the ocean their entire lives and therefore felt very connected to it.

Yeah, I've always been like around it, so I'm like really close to it. It's just like a part of my life now.

I feel that the marine environment is important to me and has always been.

Stewardship

Some students had pre-existing beliefs about the need to care for our oceans.

I see it as an important part in our lives because it is beautiful and we need to maintain that.

I see it the same as I always did. I always knew what was bad for the ocean.

I don't see the ocean differently in my way because I already know the way we need to do something about pollution and overfishing.

Ecological Values

One student described the ecological importance of the ocean to humanity.

The ocean helps us stay alive and take up like 80% of the world. So, without it we wouldn't be able to live.

Summary

Many students felt that they had a positive connection to the ocean and that the ocean was something special and awe inspiring. Interacting with the ocean gave some a sense of peace and freedom. After participating in the program, a few students remarked that they had developed a stronger connection to the ocean and its animals.

For many students the ocean was a place to play, relax, and have fun despite the fact that some acknowledged wariness about the ocean's powers.

Stewardship of the ocean also emerged as a value/belief for a number of students.

5.4- Photo Attributes

Using the power point slides that students created, this theme describes three attributes of their photos—the subjects involved, the artistic elements represented, and the emotions evoked. For each photo the photographer had to answer the four focus questions:

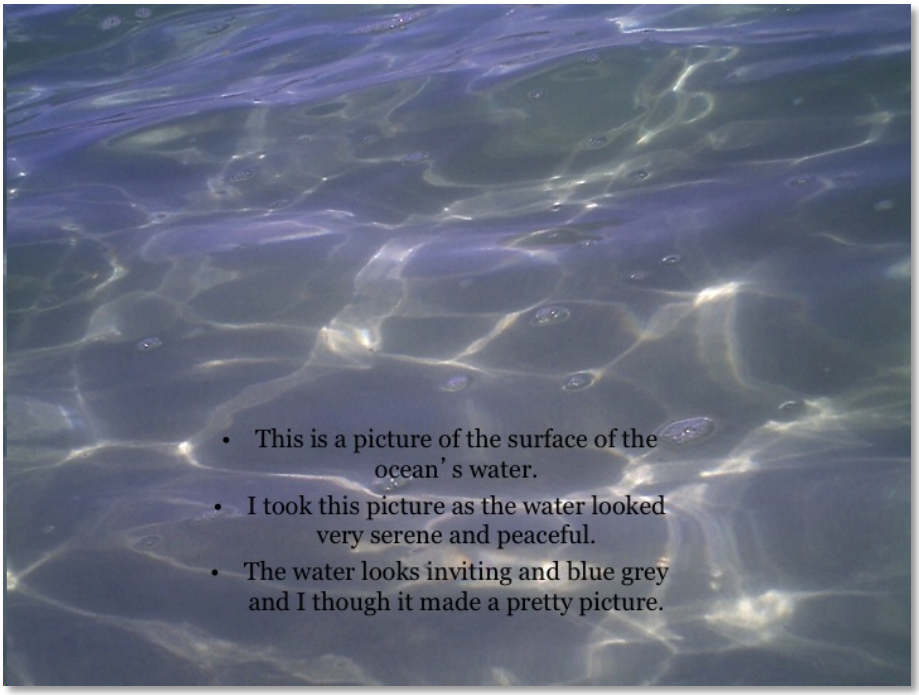
1) What is the subject of this photo?
2) Why did you take it?
3) Which artistic elements do you see in the photo?
4) What does this picture make you feel?

Subjects

This section describes the subjects of the photos taken during the student excursions.

<u>Water</u>

The most common was water. The picture below shows the surface of the water.



During the group discussion with Balcatta SHS, students discussed a photo of water flowing around a tide pool:

That's so cool. Who took that?

It looks like a waterfall.

It looks like a big waterfall, and actually it's just on the edge of the water where the . . . .

Whose picture is that?

Mine.

That's very nice; I really like that.

What's the subject of this picture?

Waterfall.

The water.

What kinds of artistic elements?

The play of the light on the water.

I like how in real life it's actually a little, a very little thing, and it actually looks substantial.

Huge.

You can't really tell; maybe a person is like this tall, and you can't tell.

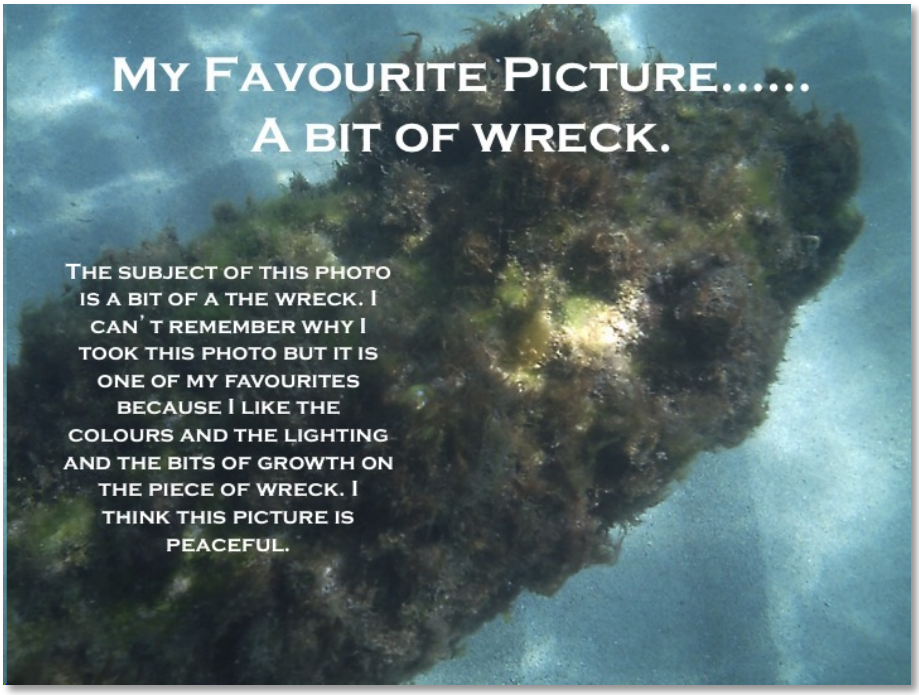
I like where the light shines on it.

I already said that. Oh, you mean with that, and it's all dark on one side.

Yeah, it's all dark and just the light is sort of like, coming in at an angle where it just picks up those thin lines of sunlight; that's exactly what it is. It's a very good picture.

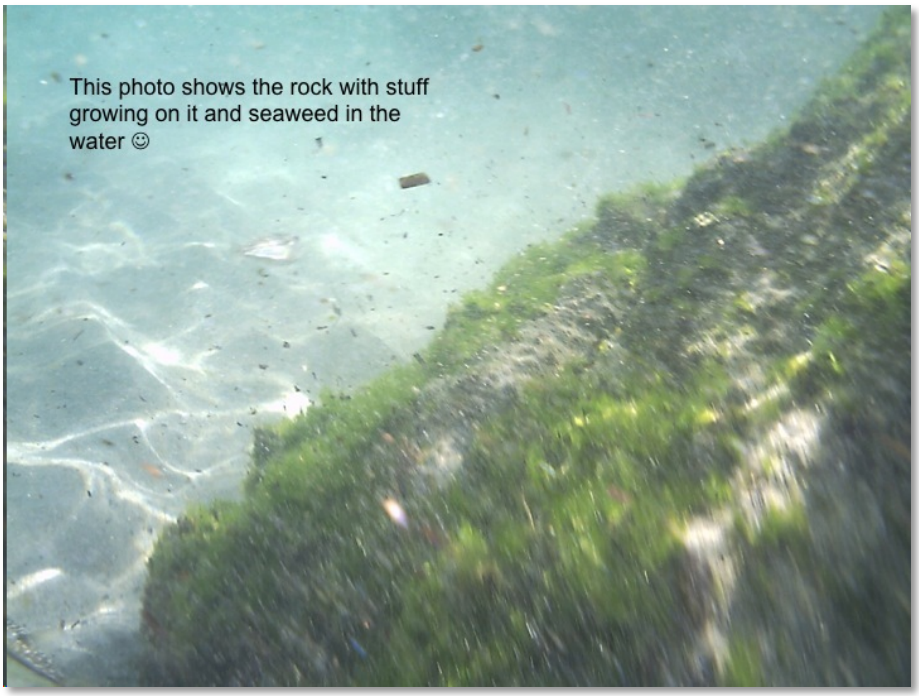
Shipwreck

Students took pictures of the HMS Omeo, which lies in Cockburn Sound south of Fremantle. Because the shipwreck is only about 15m from the beach, it is easily accessible by snorkeling groups.



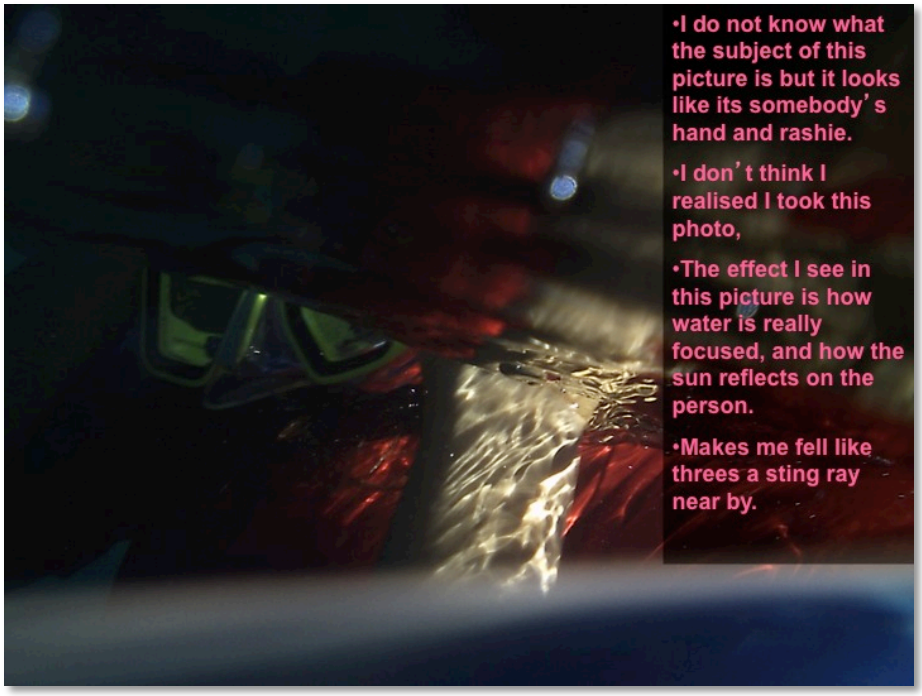
Rocks/ Reef

Students took pictures of the reef and the organisms growing on it.



Reflections

The cameras are quite good at capturing surface reflections, which became a common subject of the student photographs. The picture below shows a Balcatta student snorkeling.



The Balcatta class discussed the photo above during the group discussion:

That's cool.

What a head.

Look at that.

What a head shot.

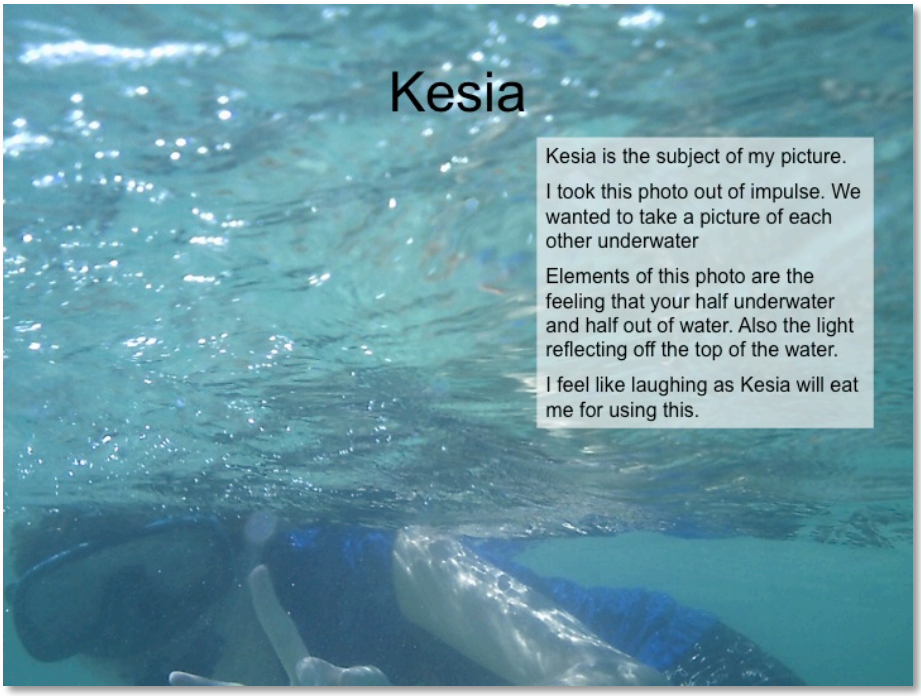
It's almost like molten; it looks like gold when melted.

Blood.

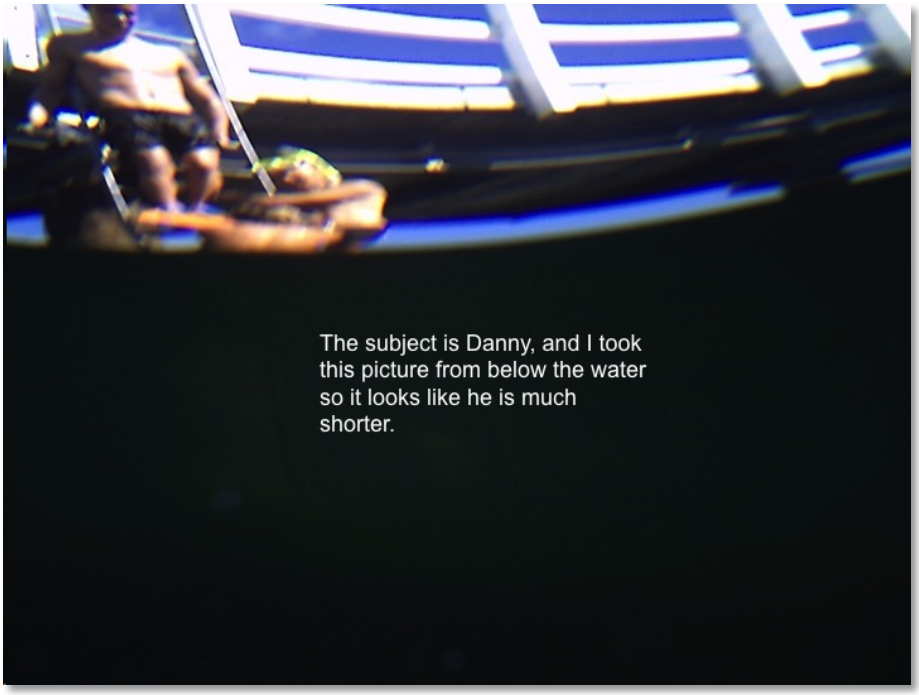
It looks a bit like blood—blood and gold.

People

People were also a common subject of the student photographers. The photo below shows one of the Leeming SHS students and her reflection.



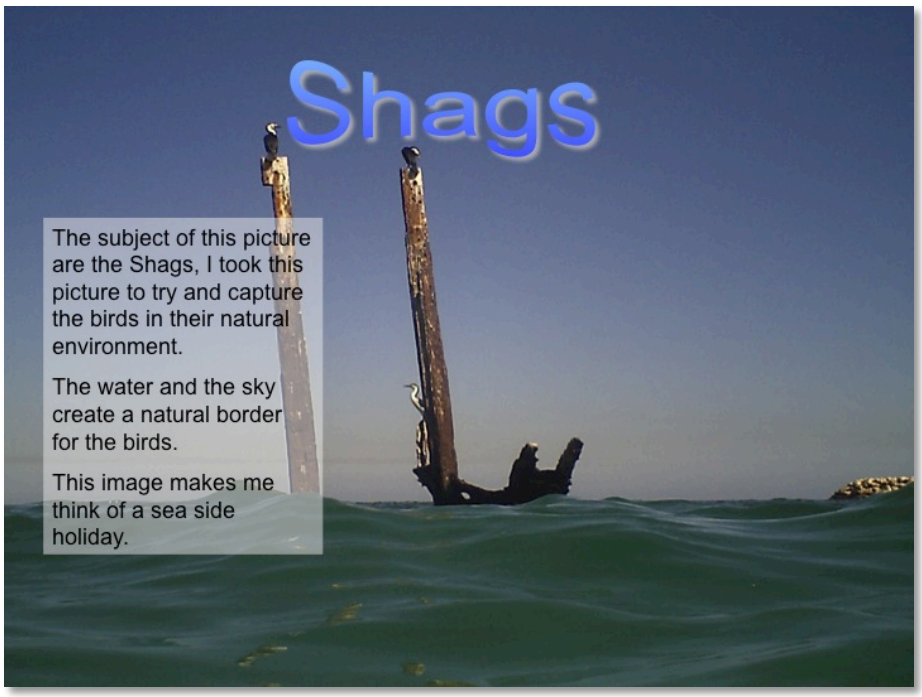
The next picture, which was taken at Busselton Jetty by one of the Busselton SHS students, shows his friends from below the water.



This Leeming student took a photo of her flippers.

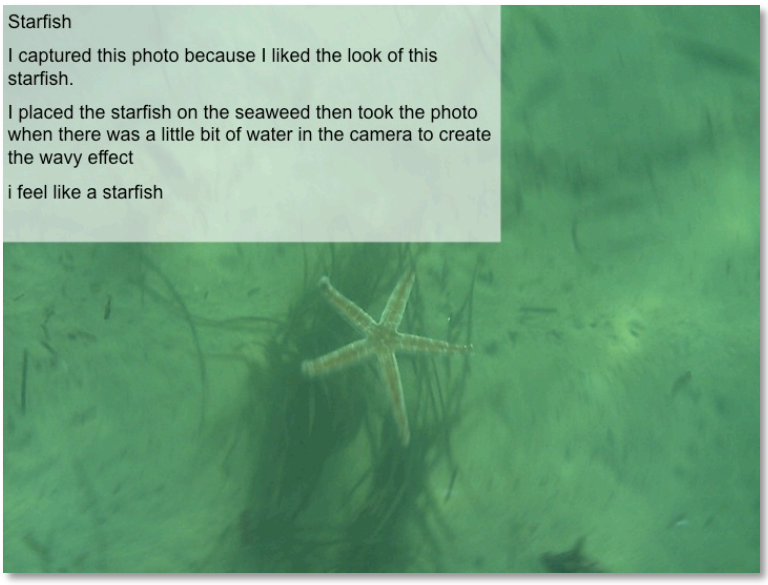
Animals

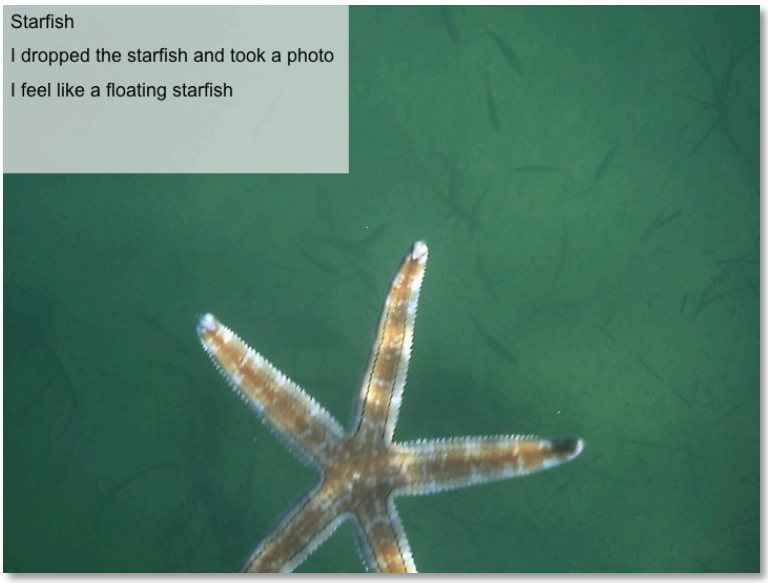
Seabirds were commonly seen on the snorkeling trips, and this photo captured two of them sitting on the top of the HMS Omeo shipwreck.

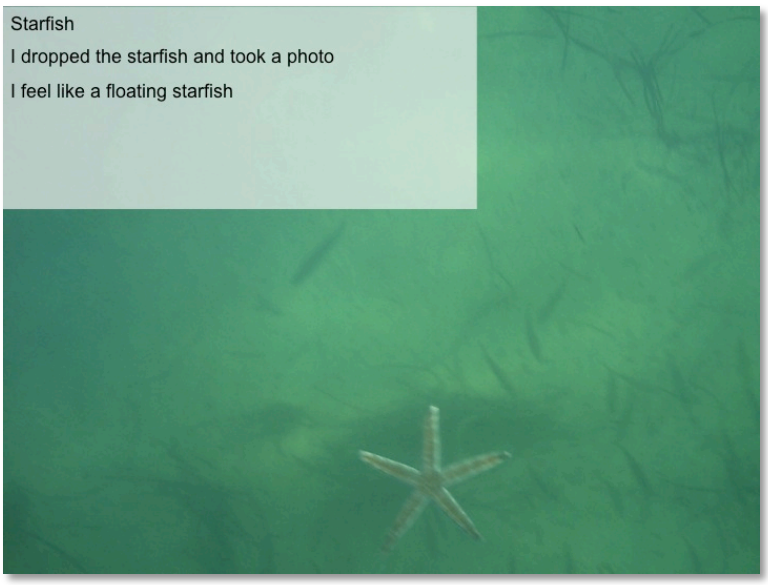


Two Busselton SHS students took the starfish series below at the Busselton Jetty.

Series 1

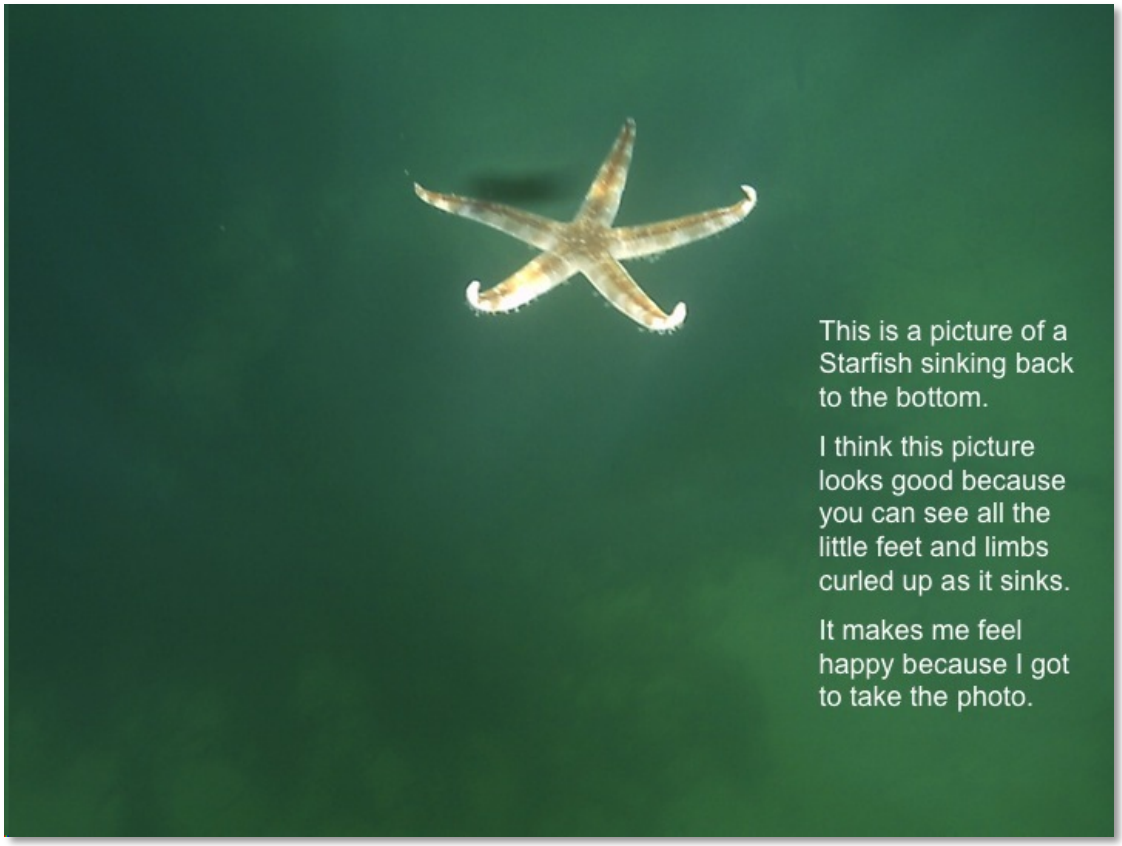


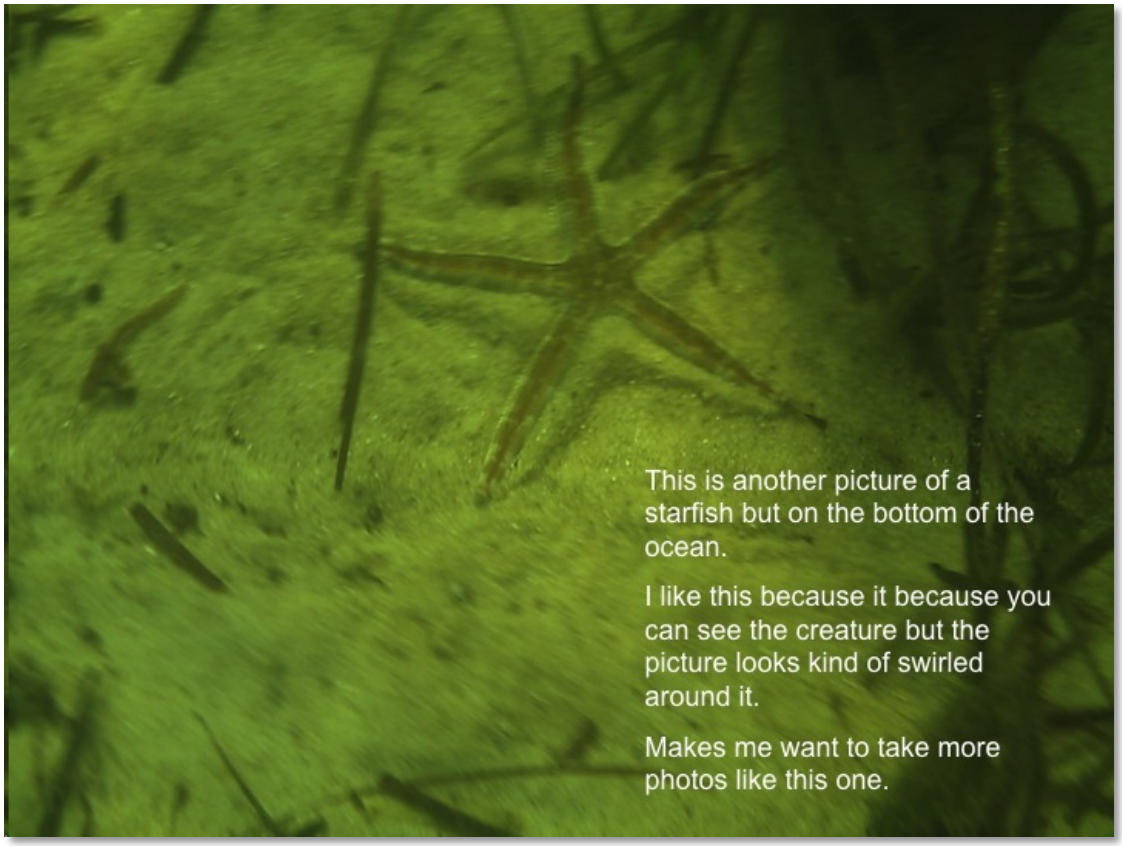




This second series, taken by another student, shows the starfish from a different angle.

Series 2

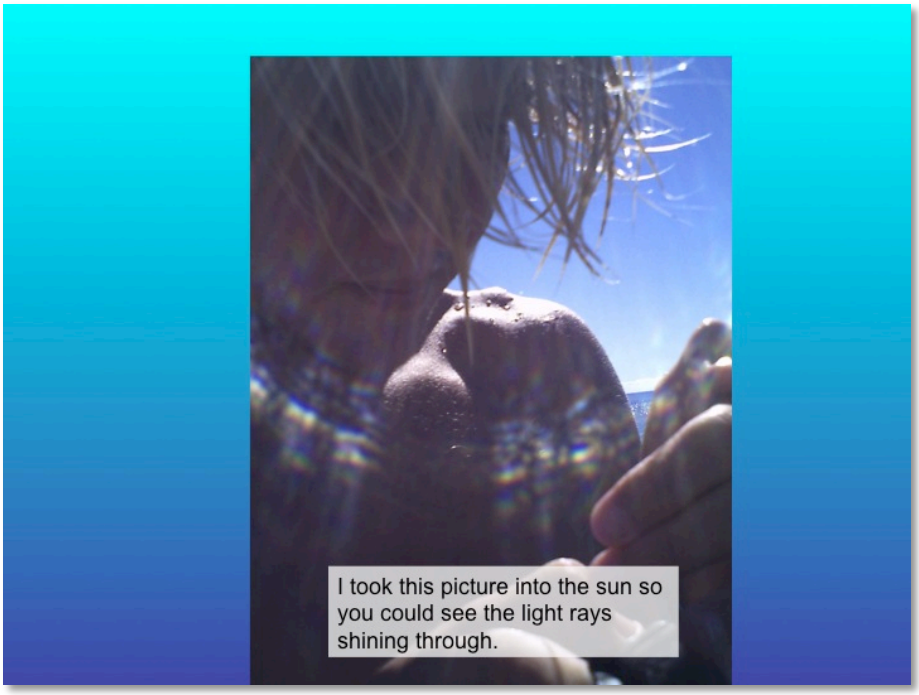

This is a picture of a Starfish sinking back to the bottom.
I think this picture looks good because you can see all the little feet and limbs curled up as it sinks.
It makes me feel happy because I got to take the photo.


This is another picture of a starfish but on the bottom of the ocean.
I like this because it because you can see the creature but the picture looks kind of swirled around it.
Makes me want to take more photos like this one.

This picture of soft coral was taken at the Busselton Jetty.

Light

This interesting photo shows one of the participants and the light of the sun hitting the lens of his camera.

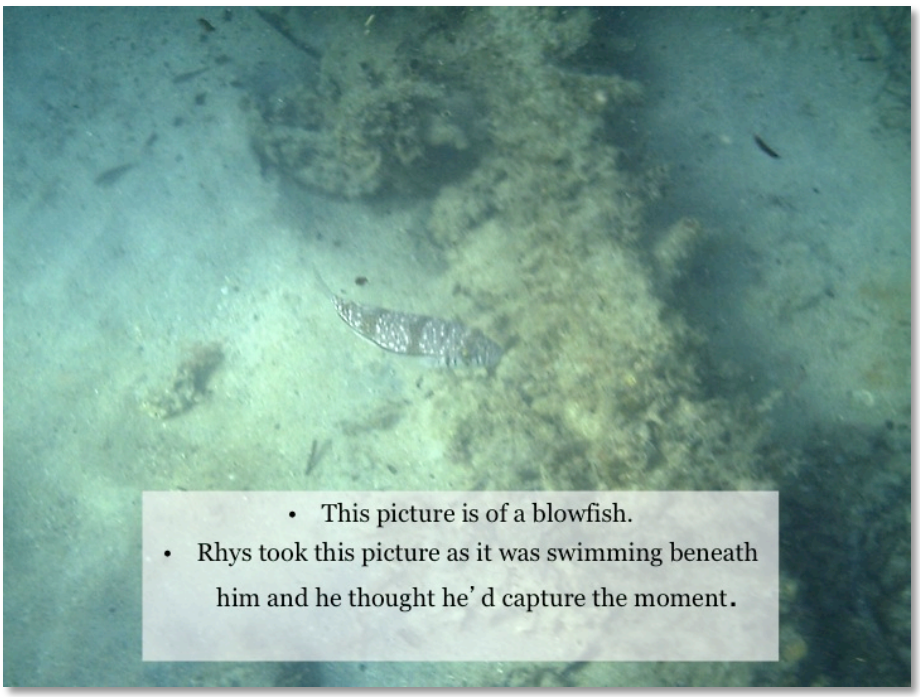


Landscape

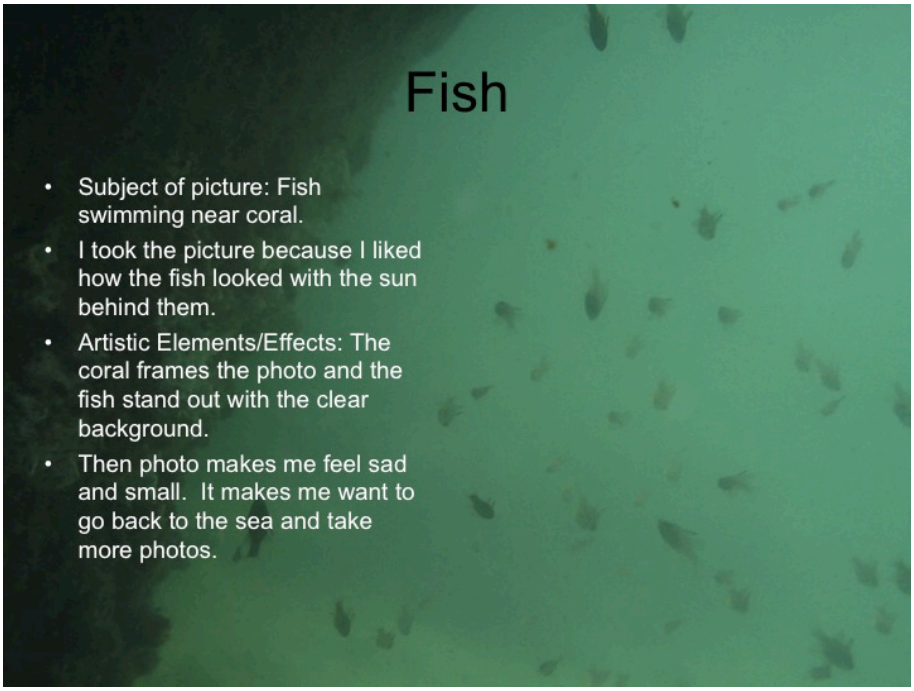
This photo is an example of the pictures that Comet Bay College students took of the beach landscape.

Fish

Although their rapid movements made them challenging to capture, students enjoyed taking photos of fish. This one is of a blowfish swimming at the HMS Omeo wreck site.

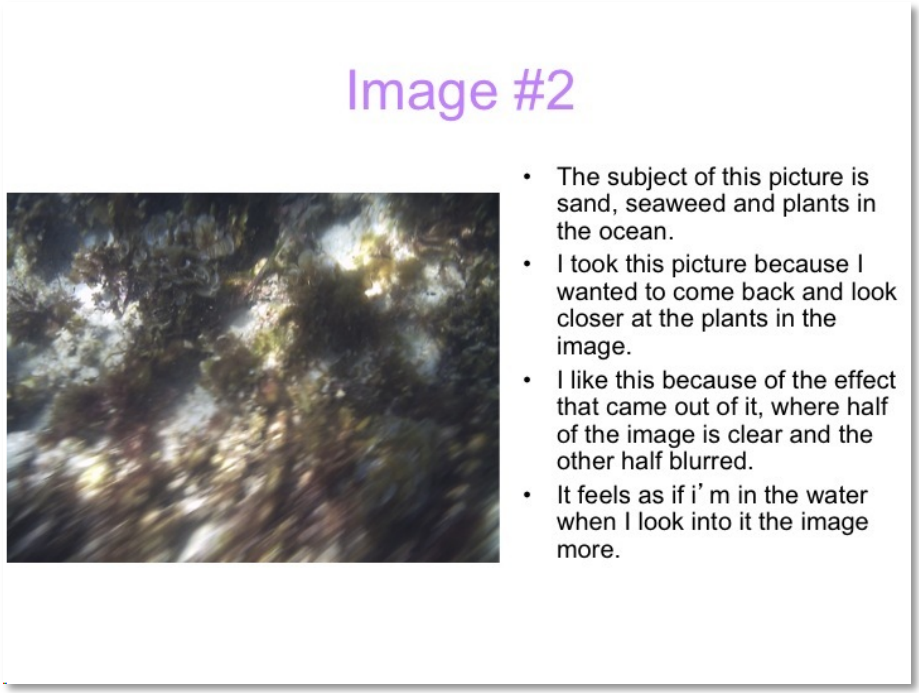


This photo was also taken at the HMS Omeo wreck and shows a school of small fish.



Algae

Because it is a compliant subject, algae were often photographed.

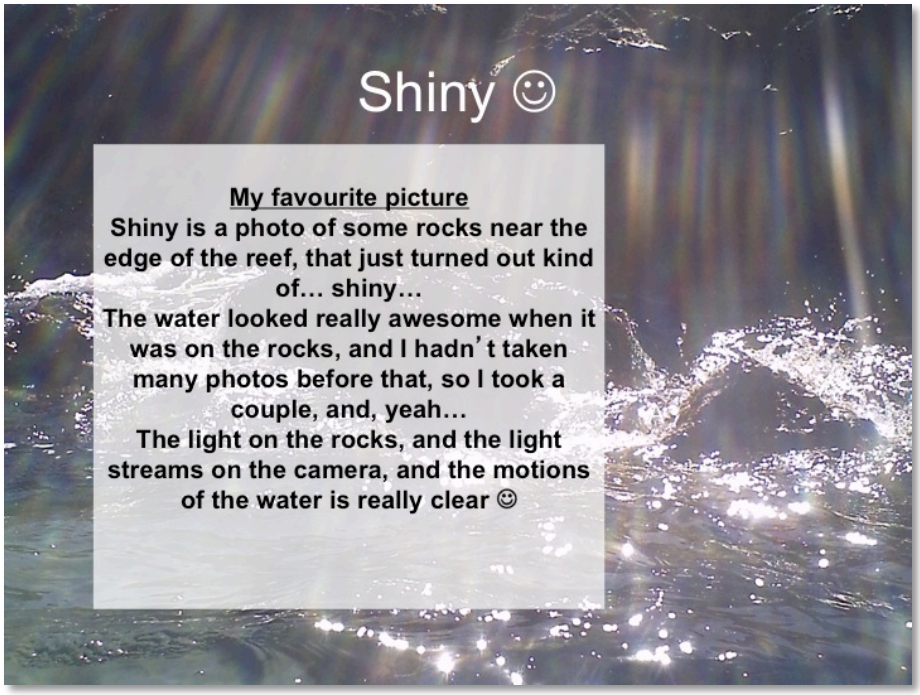


Artistic Elements and Principles

This section describes the artistic elements and principles that students identified in their photographs and records their reflections on their work.

The Element of Light

Students enjoyed experimenting with light in their images. The picture below, called "*Shiny,"* shows light reflecting off the lens of the camera.



The Element of Color

Students described the different colors that a photographer had captured on a jetty pylon.

During the class discussion with South Fremantle SHS, there was a good conversation about the color of a sponge.

Q: What about the colors in the sponge?

It's orange in the sand.

It stands out.

It's bright, and all the colors around it are dull.

It's the only bright one in the area.

It tries to be different; it's the one gay sponge in the community.

It's trying to fit in. It's mediocre.

The Element of Line

In many of the landscape photos that Comet Bay College students took at the beach, they used leading lines as artistic elements.

The Principle of Composition

Students discussed they way in which they composed their photographs using such artistic principles as depth of field and the rule of thirds. Taken at the Busselton Jetty, the photo below is of students after their snorkeling session.

During their group session, Busselton SHS students discussed the photo above.

Q: So what's the subject in this picture?

The clouds in the background look cool.

They do look cool.

How wicked is the sky?

I like how all the, you know, how most people take a photo, and they'll put the subject in the middle of the photo?

Yeah, yeah.

But in this, the actual water and the jetty and the people are in the outside.

Like a border.

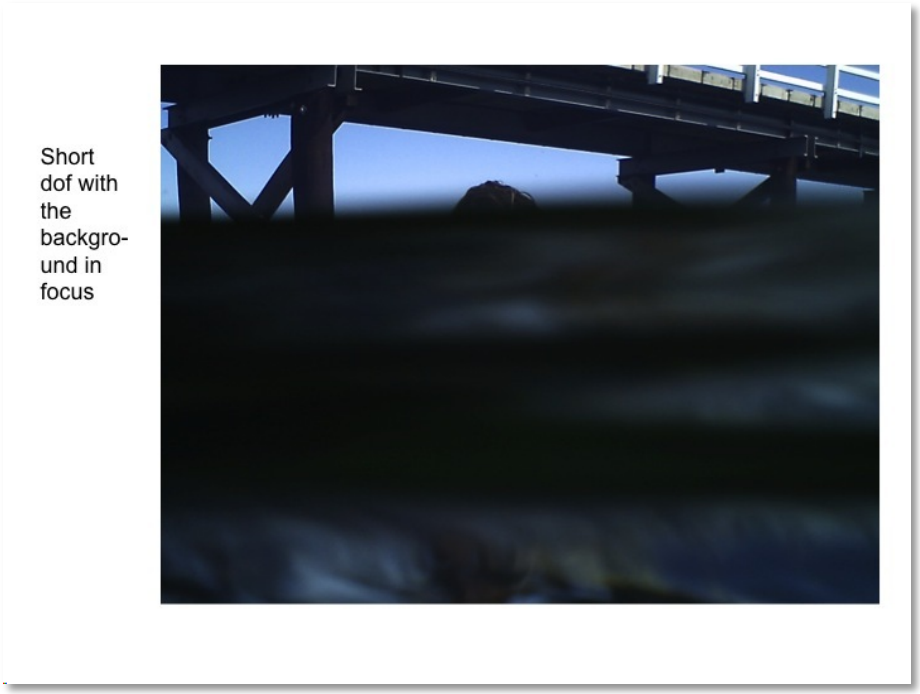
Yeah.

It's really good, isn't it?

It's kind of cool.

Whatever. Claim it.

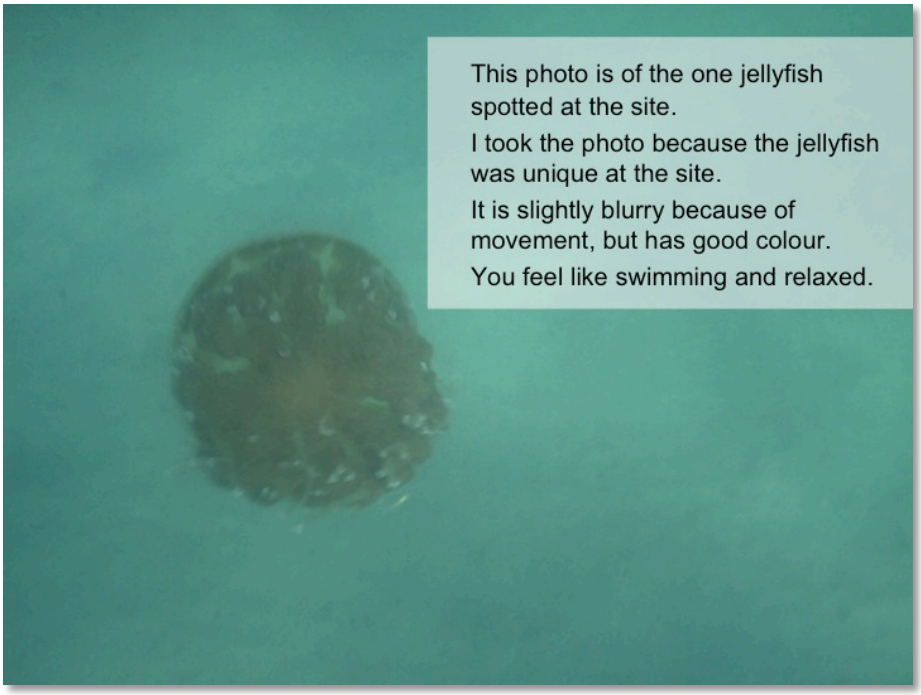
With the photographer looking up toward the jetty, this image shows an interesting use of depth of field.



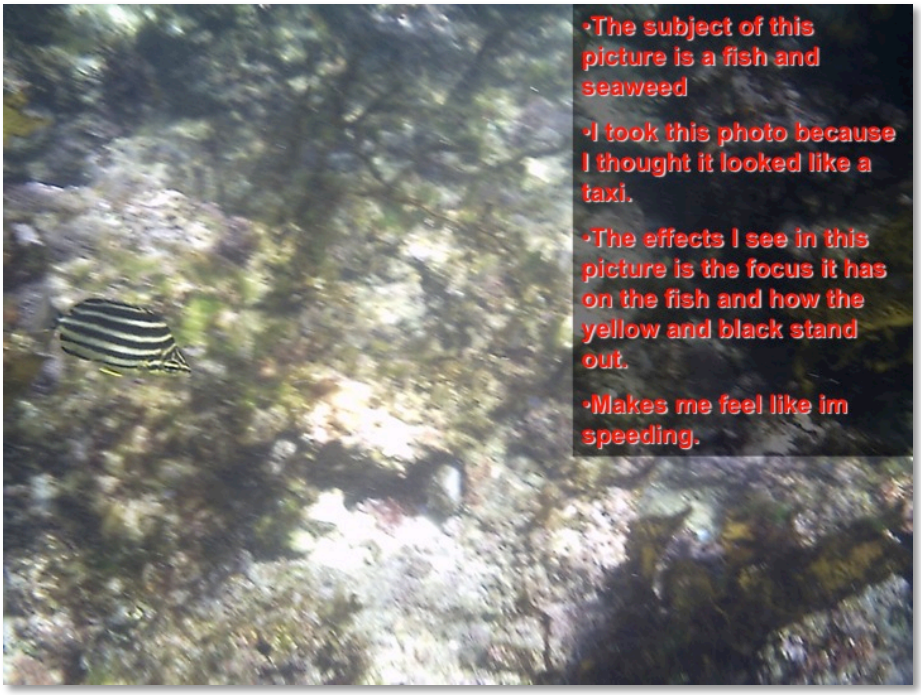
The student discussed using the rule of thirds in her photograph.

The Principle of Movement

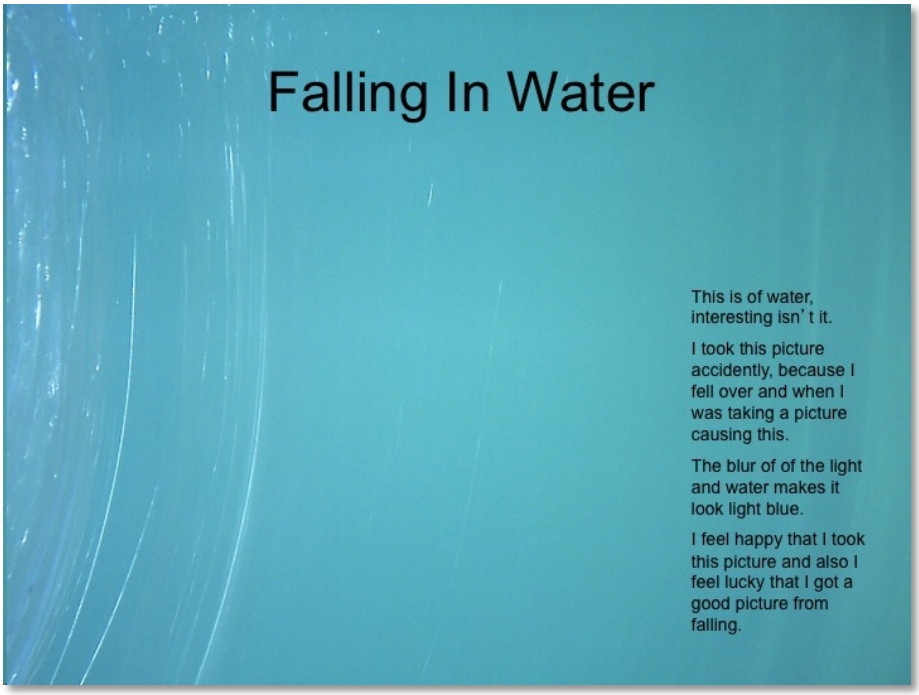
Because of the camera's tendency to produce blurry images, students could capture movement of life in the ocean. Taken by a Leeming SHS student, the picture below is of a jellyfish.



A Balcatta SHS student in Mettams Pool took this picture of a little butterfly fish.

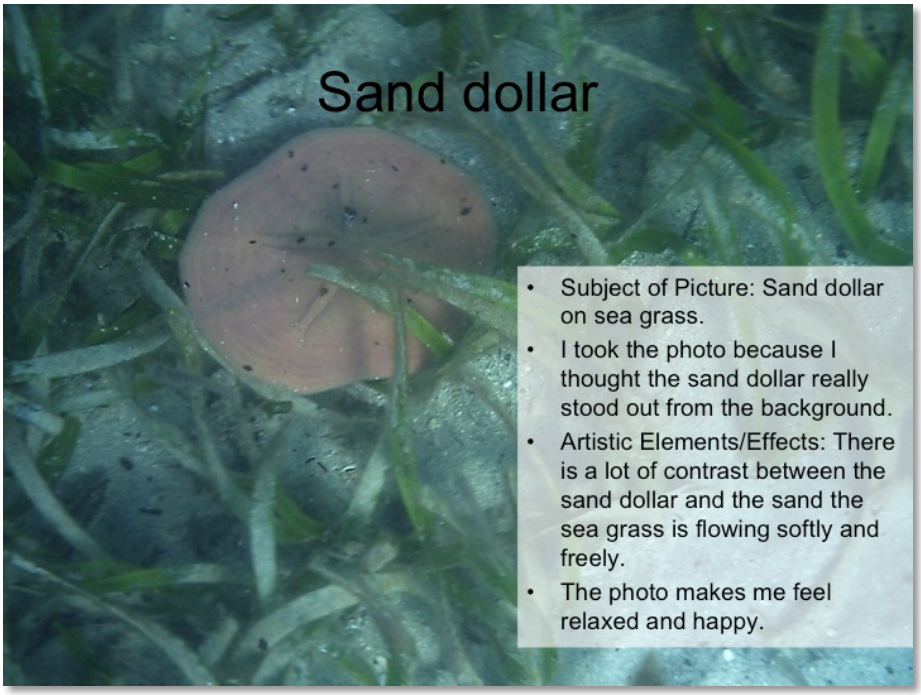


Titled "*Falling in Water,*" this picture was taken by a Leeming SHS student as she was falling into the water.



The Principle of Contrast

Students were able to show contrasting elements in their images. This shot shows the contrast between a sand dollar and the sand it is sitting on.



Painterly Qualities

Students also discussed the painterly qualities of some of the pictures.

Abstract art.

A painting.

I'd like it almost to be painted.

Affective Responses to Photos

In an attempt to identify any emotional responses that they might evoke, students were asked how their pictures made them feel.

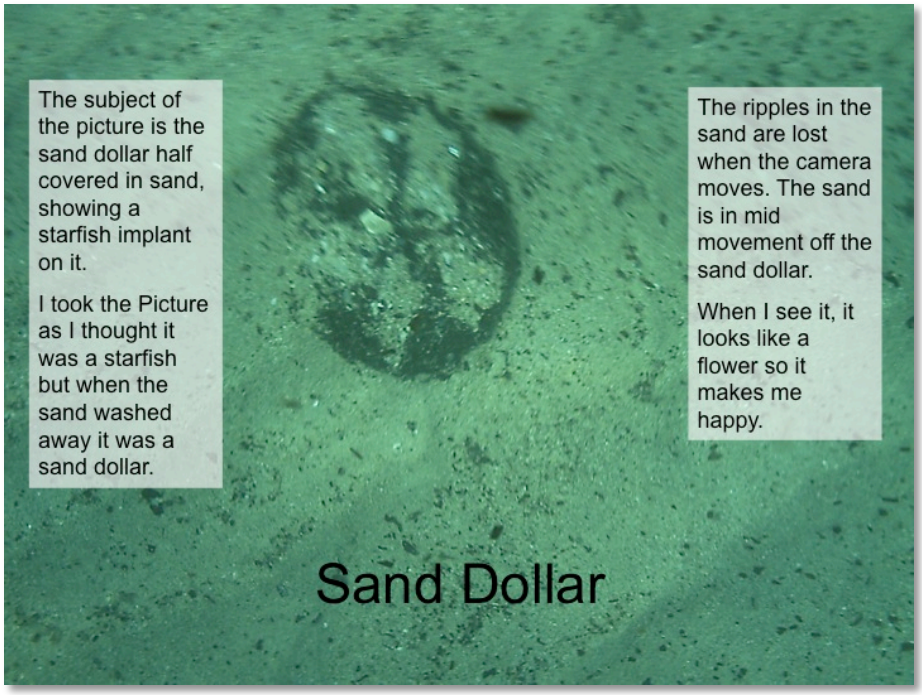
Many of the photos evoked positive responses from the students. The representative photos below demonstrate that fact.

Positive Emotions and Feelings

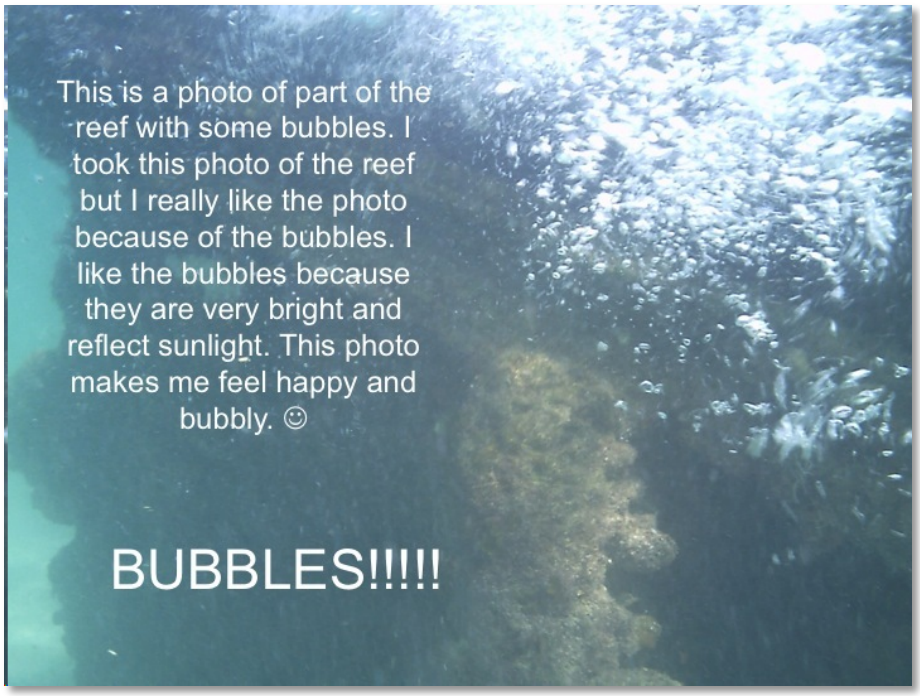
Happiness

Some of the images made students feel happy.

The image below of a sand dollar made the student feel happy because it "looked like a flower."



The bubbles in the image below made this Leeming SHS student feel "happy and bubbly."



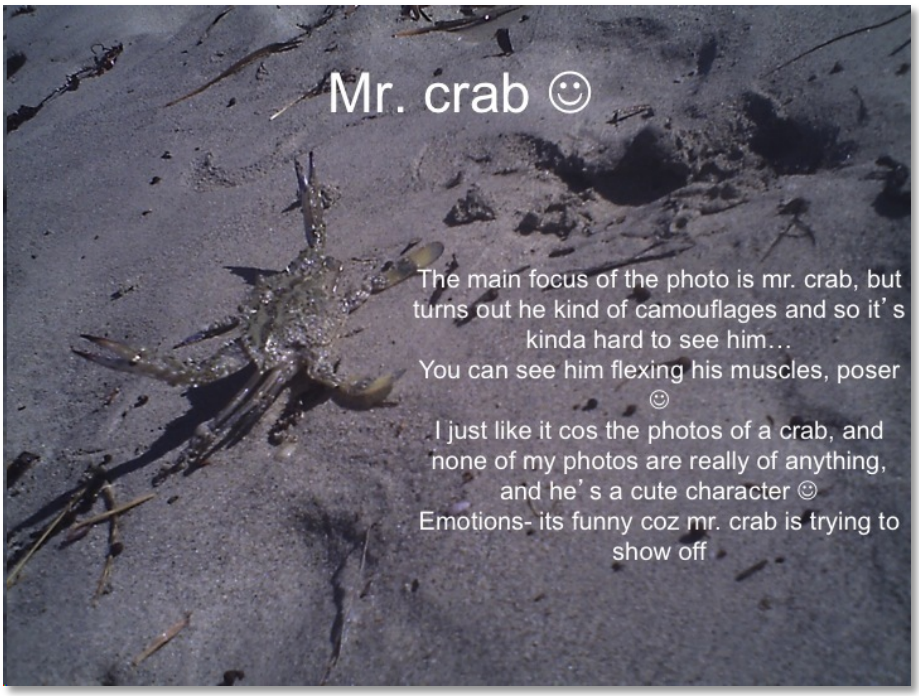
This excerpt from the Busselton SHS group discussion highlights the happiness that students felt when they were interacting with their classmates at the ocean.

> *And Jason's got a really big smile on his face. It kind of makes you happy looking at the photo. Well, don't you reckon? Seriously though? Like it looks like they're having fun in the sun. Having a great time.*

Humor

Students found humor in some of their photos, especially ones picturing charismatic animals.

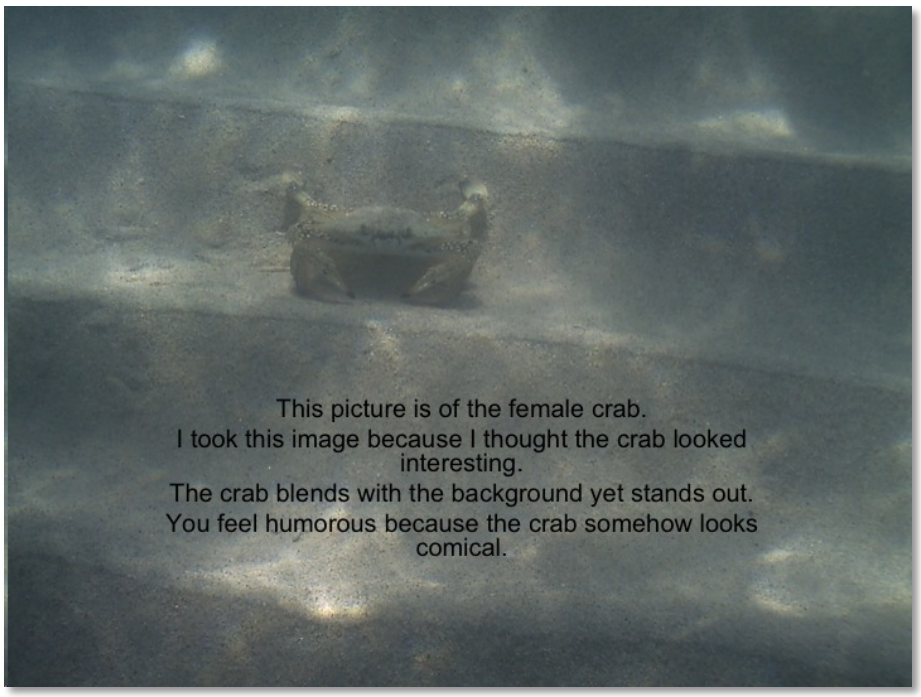
This photo was found to be funny because "Mr. crab is trying to show off."



When it was discussed in class, the students responded positively to the crab photo.

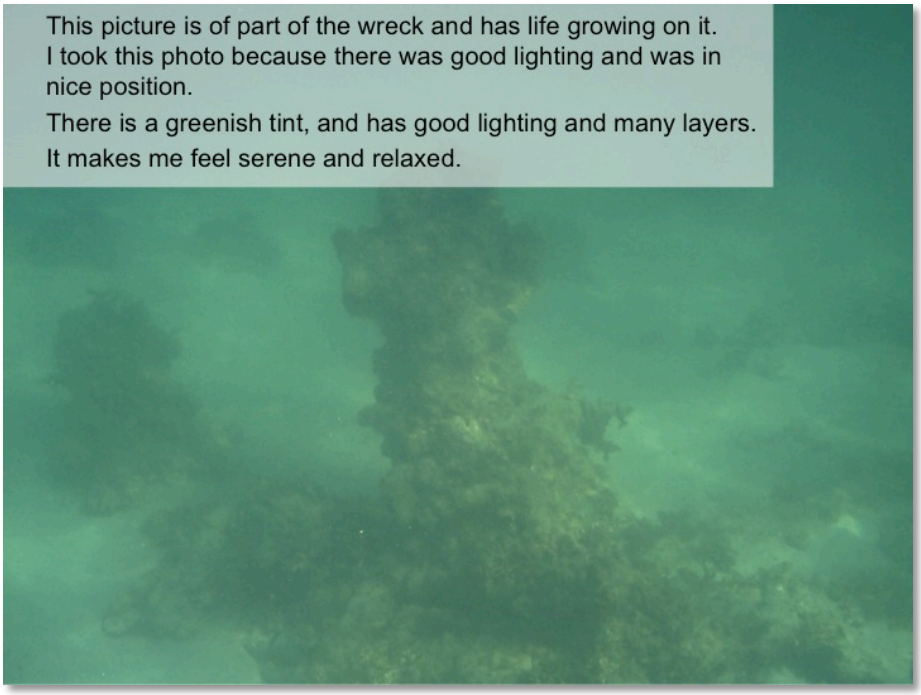
> *I feel like laughing, because it's trying to start on you with one arm.*
>
> *Looks like he's trying to dance.*

A different picture of a crab evoked similar responses.

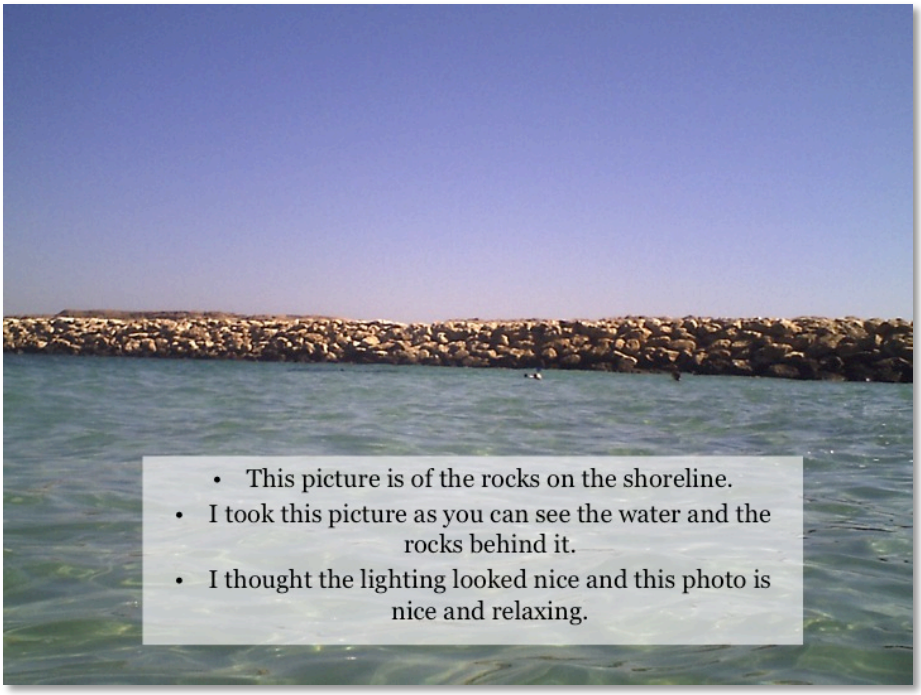


Relaxation and Peace

This photo, which depicts part of the HMS Omeo shipwreck, made the student feel "relaxed and serene."



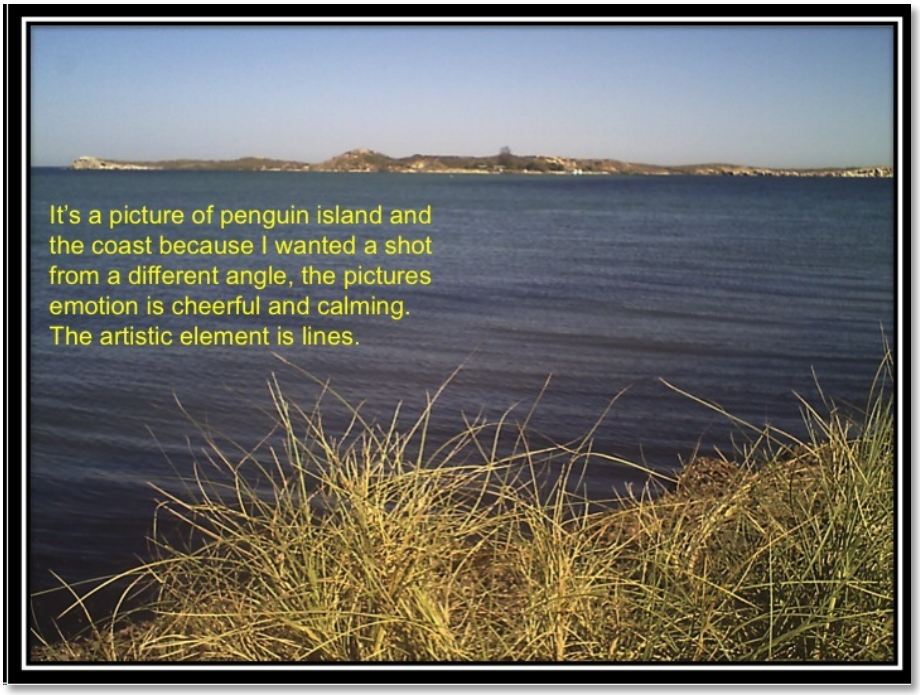
This photo of an artificial jetty made the participant feel “relaxed.”



The bubbles in the picture below appear to have a calming effect on the photographer.

Looking at this photo of a manna crab was calming for the student photographer.

Comet Bay College visited the foreshore facing Penguin Island, and the students found this shot in particular to be quite calming.



Comet Bay College discussed the picture above during the group session:

What does this picture make you feel?

Calm, happy.

Wet.

Soothing or something.

Its kind of neat, you can't see off to the side, but there's the reeds and stuff

That's lovely and calming, isn't it?

That one's a clear shot. It's a really clear shot.

Negative Emotions and Feelings

Some of the pictures elicited negative responses from the students.

Comet Bay College had a chance to discuss South Fremantle's evocative jellyfish pictures, and even though they had not experienced the jellyfish first-hand, they had similar negative reactions to the photos.

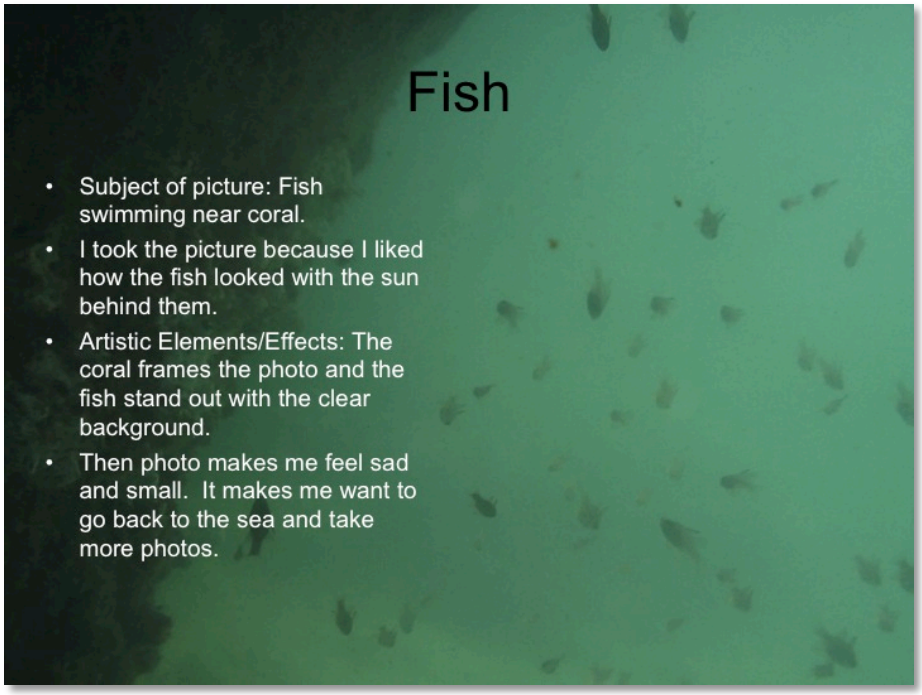
Do you feel anything, you guys, from this picture?

> *It sort of feels like you're drowning, because of the colors and the gold; I don't know.*
>
> *And the other fish is going downwards, and it looks really awkward.*
>
> *Drawing you down into the deep sea.*

<u>Sadness</u>

During the group discussion, Balcatta students talked about a photo that made them feel sad.

> *Empty, it's too plain.*
>
> *Lonely.*
>
> *It makes you feel sad. [D] said sad.*
>
> *It looks lonely. And because there's not much sunlight, seaweed, or rocks, it's very stark out there.*
>
> *Although a photo of a group of small fish made the student feel "sad and small," it also motivated her to take more photos.*



Discomfort

Another photo taken by a Comet Bay was of an old barrel sticking out of the seaweed. The photo was unfortunately lost, but the emotion that it evoked during the class discussion is obvious.

> *I don't like it; change it.*
>
> *It's making me feel dizzy.*
>
> *Makes the beach look sort of dirty.*
>
> *It's like an urban beach.*
>
> *Yeah it looks dirty, so that gives it more of a sort of dirty industrial sort of look.*
>
> *I think it's symbolic, saying that everyone looks at that as dirty just because it's litter, and there's nothing else of its kind, so it's lonely. So it's lonely, and nobody likes it.*

One of the photos taken by a Busselton SHS student also elicited some very negative emotions.

What does it make you feel?

It does look terrible.

Someone's getting drowned.

It looks like someone's drowning.

It does actually.

It feels cold.

It's like drowning.

What does it make you feel?

It feels sad.

It's like someone's depressive.

Despair. Remorse.

It looks like a bit like the hand's pushed under against the glass.

It makes me feel like I'm watching Titanic.

The glass, like in Titanic.

It's like they're in a bowl.

One of the photos discussed in the Busselton group made the students feel as if they were physically cold.

No, I reckon it looks icy around.

Like it's a frozen lake.

Oh, my god.

Like snow.

Yeah, well that's it. Yeah. On the trees.

Like a frozen lake.

It makes the water look more of a lighter blue.

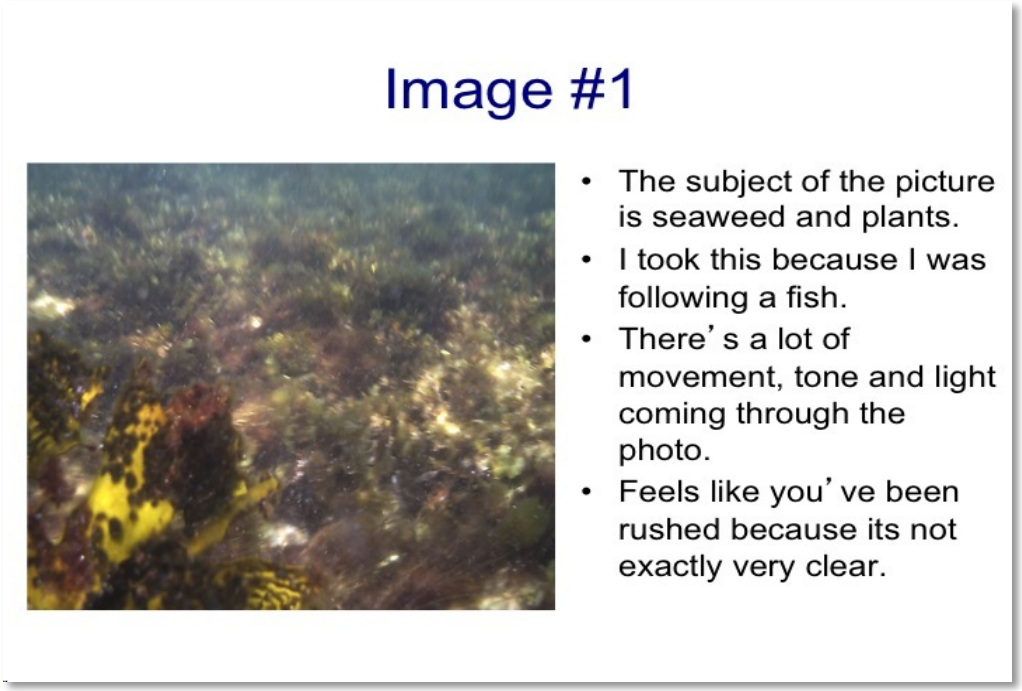
Maybe it's the weather. It looks . . . .

Really cold?

Disconcertion

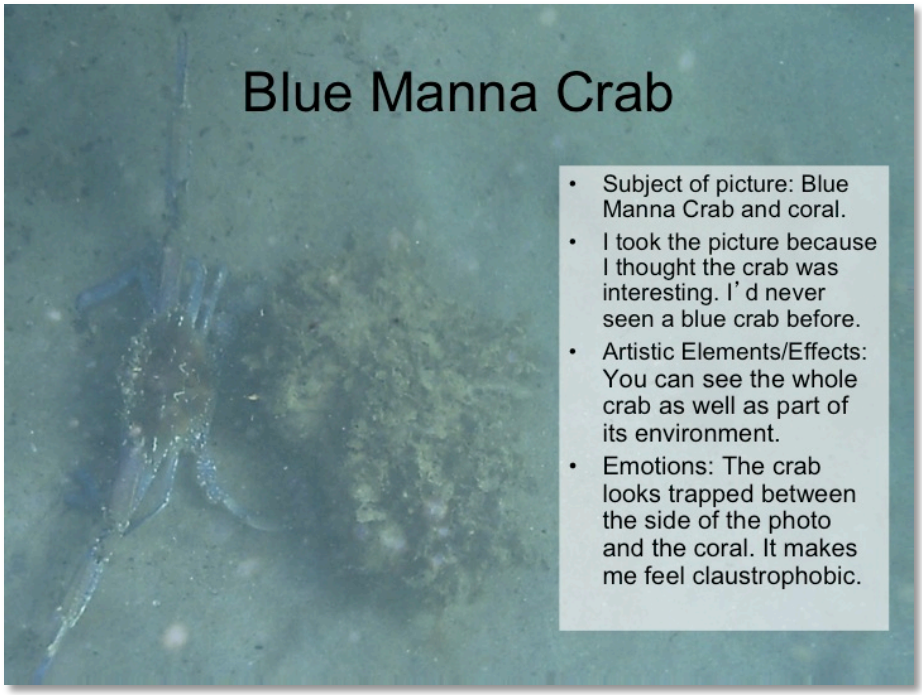
The photo below made the student feel lost.

Sometimes, the students felt disconcerted by the movements in the pictures. For example, this particular picture made the student feel rushed.



Claustrophobia

The student photographer, who was sympathetic to the crab, experienced claustrophobia because the crab looked trapped.

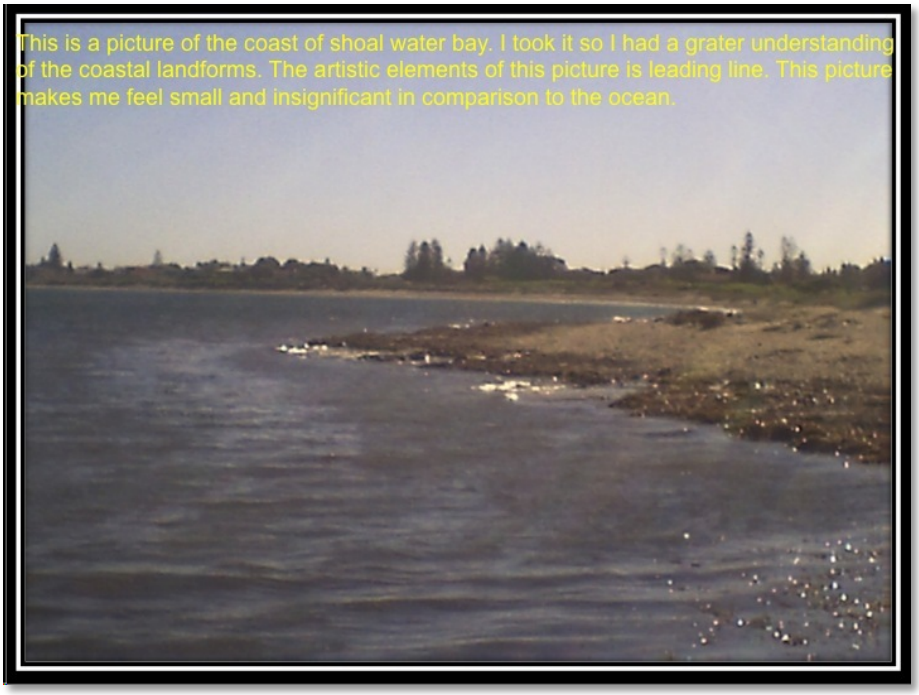


Intimidation

This photo of a crab made the student who took it feel intimidated even though the animal was “so small.”

Insignificance

This photo of Shoalwater Bay, taken by a Comet Bay College student, made her feel “small and insignificant in comparison to the ocean.”



Summary

During their explorations, students photographed a variety of subjects, including landscape features, marine animals, and other students. Over the course of the program, they developed a more artistic eye. As a result, in the group discussions they were able to talk about the artistic elements—light, color, and line—and principles—composition, movement, and contrast—that they used in taking their pictures.

Students reflected on many positive responses to their photos. Images that were light, bright, clear, and open were met with positive reactions. Some made the students relaxed and peaceful. Others made them laugh and feel happy.

However, students also reflected on some negative responses. The biggest source of negativity was the photos of the jellyfish that stung one of the classes. Most of the other images that elicited negative responses showed evidences of pollution, death, or helplessness. The students felt overwhelmed, sad, insignificant, or claustrophobic.

5.5- Post-SUYO! Awareness

Increasing awareness of the marine environment through direct experience is one of the main goals of the SUYO! program. This goal is achieved when students explore underwater and shore-based environments through the lens of a camera—an activity that encourages students to visit new areas and empowers them in their exploration.

> *I had pretty uplifting experiences, actually. Snorkeling opened up a whole new world to me.*

Experience-Based

Students saw many things that they had never before witnessed in the ocean. A number were surprised at the amount of life and the variety of species that they discovered once they got below the waves. Photography gave them a new way in which to view the underwater world.

> *I enjoyed looking at the photos that I took because you can see detail that you wouldn't have seen before while snorkeling.*

Shipwreck

For many students, the HMS Omeo was the first shipwreck they had seen.

> *My new experiences were snorkeling, exploring sunken ships and seeing crabs at a local beach.*
>
> *Diving down to look at the shipwreck was fun and I enjoyed it very much.*

One student was surprised that the HMS Omeo foundered so close to the beach.

I didn't think a shipwreck would be that close to the shore.

Reef

Students were excited to discover and explore the reefs that lie off Perth.

The reefs were amazing! They are something you don't expect to see when in the ocean.

It was good to look at the reef and fish that lived down there.

Human Impact

One student observed human impacts while she was snorkeling.

I found a beer bottle down there. I wasn't sure if I should pick it up or not, because there might be something in it.

Animals

While they were snorkeling and photographing, students discovered many animals new to them.

Got to see the underwater life that I'd never seen before.

I saw some animals that I have never seen before.

There are lots of new things to see out in the open. I've seen all types of fishes, and deep blue sea. These experiences were the best time ever.. you felt like a fish in the sea.

Some students had never before seen the types of jellyfish encountered on the snorkeling trips.

I'd never seen like that type of jellyfish before really. I'd only seen the real little ones.

A common perception of the ocean was that only sand lies under the waves.

I see now there are other things in our ocean, not just sand like it normally is.

Now I see the ocean is livelier because of the varieties of organisms I saw during the exercise at Coogee beach.

Knowledge-Based

Photography

Students learned about photography and how to analyze photographs from an artistic perspective.

I know there's more detail to the picture than you think there is. That's what I really learnt.

Yes, now that I know how to take underwater pictures, I will take more of them.

Environment

Students came to realize the diversity of life under the surface of the water,

It's not just water, salt and sand there's other things such as plants, flows and animals.

Yes, I would love to take more photos then I would have more flora and fauna to learn about.

They also learned where the good local snorkeling spots are.

I will go snorkeling more now because I know better snorkeling spots.

When a student's picture of seagrass was shown during the class discussions, the teacher used the opportunity to teach the class the biology of this underwater plant.

(South Fremantle SHS)

Teacher: What's the difference between the algae and the sea grass?

Student: It looks soft.

(T): So one's a little bit softer and more fragile.

(S): The algae is a lot brighter.

(T): More vibrant?

(S): The sea grass looks more green and the algae is like [inaudible]

(T): So the sea grass sort of stands alone, or [inaudible] is that what you're saying?

(S): The sea grass is more freer.

(T): Oh it's less rigid.

(S): Sea grass is a flowering plant and that's not.

(T): Sea grass is an angiosperm indeed, whereas algae is algae.

Summary

Students experienced many aspects of the marine environment that were new to them. The HMS Omeo was just one example. Most students had never snorkeled over a shipwreck, which surprised them by being so accessible and close to shore. The reef (Mettams Pool) was also a place previously unknown to most students. Even if they had visited the surrounding beach, snorkeling and exploring the reef structure was a new experience and the basis of new observations. Seeing different kinds of animals was the most common source of excitement for students, for many had not observed marine life in its natural habitat and were therefore unaware of its variety and quantity. Increasing student awareness of the marine environment through direct experience is fundamental for understanding our oceans.

Prior to participating in SUYO!, students had had little experience with photography. During the program they learned how to take underwater photos and to examine and analyze them from a more artistic perspective. Interestingly, the class that had the most engaged analysis of their photos was Comet Bay College, the school that did not go underwater.

Students learned about their marine environment from their first-hand experiences. At times the teacher facilitated discussion about a particular marine organism captured in a photo. Students also learned about good spots where they could snorkel in the future.

5.6- Post-SUYO! Perspectives

After experiencing the ocean environment and looking at and sharing their photos, many students gained new perspectives on the ocean. These perspectives came from new experiences and new observations.

Perspectives on the Ocean

Participation in the program causes students to change their views about the ocean.

It has opened a new way for me to see the ocean.

The way you see the things in the ocean (fish, etc.) will change, as we analyzed our photos, and you were able to see how the fish reacted to you, and you got a good idea of their natural environment.

A New and Different World

A commonly recurring theme was that the ocean is a new and different world.

It's like seeing a whole new world.

Snorkeling is an experience in itself. I have only been once before, but I was like six. The ocean is like a whole different world down there.

Underwater photography was like a whole new experience for me. It was like I was in a whole new world.

A Less Frightening World

Being able to safely swim and interact with the ocean's creatures changed previously held perspectives that the ocean is a dangerous place.

I see the ocean a little differently now; it's not as scary as I thought it was.

I see it as a friendlier place.

I see that besides all the news about sharks, the ocean is a colorful and calm environment.

It was freezing, but you soon forgot the cold when you saw the beautiful fish.

A More Vast and Diverse World

Previously, some participants had held the view that life in the ocean was quite simple. However, this first-hand experience changed that view. The students observed that there was much more diversity of life in the vastness of the ocean than they had previously thought.

> *There were lots of new things to see out in the open, seen all types of fishes, and deep blue sea. This experience was the best time ever; you felt like a fish in the sea.*
>
> *I didn't realize that it was full of life that I could see 50m offshore.*

Yeah. It's not just like fish and seaweed and stuff. There's like different types and all that.

> *I see now there are other things in our ocean, not just sand like it normally is.*
>
> *Now I see the ocean is livelier because of the varieties of organisms I saw during the exercise in Coogee Beach.*

I see it a bit more different, like as if there's like more under there that I haven't seen. Like, there's more to discover.

> *I don't see it really different, but I do realize now that it's such a diverse place and you don't know what to expect as it's so immensely big.*
>
> *I see that it is a lot bigger than I first thought.*

> A Different Perception of the Ocean

Students began to understand that by experiencing the ocean in different ways, they could see it differently.

> *You see it differently from the shore, on the surface, and under.*

I used to just see the ocean as the beach, but now that I've experienced snorkeling, I could see the ocean clearly underwater.

It now gives me a better image of the ocean.

When you are on the surface, you are only seeing like the top of what's down there.

More on a scientific level because of what I've learnt.

Because I have realized a new beauty in the ocean.

New Perspectives on Human Impacts

Students noticed various human impacts on the sites where they snorkeled, and they therefore re-assessed their perceptions of the ocean.

Yes, I've always thought of the ocean as just sand as the bottom when in fact there was man-made junk that had become a home to many sea creatures.

Well, once I go diving, and I experience all the rubbish and stuff down there, it sort of opened my eyes a bit.

Unaltered Perspectives on the Ocean

When asked if their perspectives on the ocean changed, a small number of students answered in the negative.

They won't.

No change.

Not really because I haven't had the chance to scuba yet.

I don't see the ocean differently in my way because I already know the way we need to do something about the pollution and overfishing.

I don't see the ocean differently.

Perspectives on Photography

Student examination of and discussion about photographs improved their understanding of photographic quality and gave them new perspectives about how they could use photography in their lives.

Seeing More Photographic Opportunities

Rather than just looking passively while they were swimming, students began to identify opportunities to take photos.

There's more photo opportunities. Like, when I look around in the water and that. I just think, that could be a good photo.

I see the ocean as a big photo opportunity from the experience I had.

Looking at and Analyzing Photographs

After participating in the program, students began to understand the different ways in which they could look at and analyze photographs.

There's more to a photo than just looking at it.

I know there's more detail to the picture than you think there is. That's what I really learnt.

Well, if you just look at a picture, you just look at it for like a second and go, "Yeah, that's a good picture. Next." But if you really take the time and look, you can spot detail.

Seeing the Ocean Differently Through Photography

Through the process of examining the photographs as a group, students were exposed to different perspectives on the ocean.

> *I see the ocean differently now because by doing this experiment, it has opened my eyes to how different the underwater world is from how different everything looks to how the different emotions are provoked.*
>
> *I feel like there is more out there and that you can see it differently through pictures.*
>
> *The way you see the things in the ocean (fish, etc.) will change, as we analyzed our photos, and you were able to see how the fish reacted to you, and you got a good idea of their natural environment.*
>
> *The only way I see the ocean differently is by looking at the photos; you could see how the animals lived and how humans would affect them.*
>
> *Like it's just different to when you're like underwater and when you're just looking at the pictures. They look different. I don't know.*

Summary

For the most part the relationship that students have with the ocean was affected by their participation in the SUYO! program. The snorkeling experience even helped some overcome the fear that they had of going in and under the water. It also gave rise to a common new understanding that the ocean is a vast, diverse world very different from the terrestrial one that they experience every day. Students saw that the underwater environment is home not only to sand but also to abundant life forms, differing habitats, and changing topographies. In addition a few of the students discussed their increased awareness of human impacts on the ocean that was gleaned from observing trash that people had left behind.

A sense of discovery and excitement always permeated the group discussions about the photos that each student took. The experience with underwater photography encouraged the students of look at the ocean with a great artistic sensibility. After snorkeling as novice photographers, many students began to seek out photo opportunities that could result in artistically conceived pictures. The group discussions gave all the students the opportunity to learn about different ways of perceiving the marine environment.

Photographing the marine environment and discussing their images led students to start to examine how they viewed the world in general. Instead of looking at something, making a judgment about that object, and moving on, they would stop and question themselves why they had made that judgment. This cognitive process is complicated, and it appears as if the SUYO! program has helped to foster this kind of awareness.

Of course, some of the students averred that their perspectives on the ocean were not changed by their participation in the program. However, the majority of the students came away from the program with their awareness of the ocean expanded and their perspectives on the marine environment altered by both direct experience and underwater photography.

5.7- Post-SUYO! Intended Behavior Change

Students talked about their belief that their interactions with the ocean would change because they had participated in the program.

> *My interactions with the ocean will change because I had a good experience with the ocean so I enjoy it more now.*

Interest in Photography

A common desire among many of the students who participated in the program was to become more involved with underwater photography. In general the students were quite excited about this part of SUYO!

I would like to do more photography because photos can express my feelings towards the ocean.

I will take more pictures underwater now because it's actually quite fun to see what the results are after taking the pictures underwater and seeing those pictures in artistic ways.

I probably will take more photos as I have an underwater case for my camera already, and I have seen that there are many opportunities out there.

I often go snorkeling, and I will definitely take photos. The photos that you get turn out really differently to those that you will take above water.

I will take more pictures because I want other people to see what I have seen. It's truly an amazing sight.

I only just got an underwater camera, and I want to use it too.

Q: Because of the program?

Yeah.

More Time In the Ocean

After participating in the program, many students wanted to spend more time in the ocean.

I will go in the ocean more because I want to experience the beauty of the ocean again.

I will go in the ocean more because I enjoyed the experience I just had.

I will probably just snorkel more than I do now.

Yes, so I can surf.

I think I will go surfing more and skimboarding.

I would definitely be going to the beach more often because of the excitement of looking at other organisms.

Yes, but only with friends.

Interest in Increased Stewardship

Some students wanted to take better care of the ocean after their participation in the program.

I will probably interact with the ocean more by trying to conserve the environment.

Well, by helping the flora and fauna in the ocean and collecting all the rubbish in the ocean underwater to help the organisms.

I will be more careful because I know what different life forms are below.

I'll be more careful.

Interest in More Exploration

After they experienced the underwater world, students were motivated to explore more of the ocean.

I will try and look underwater more to see what life there is.

I will because it was an amazing experience and would love to try new places—e.g., Cott or Rotto.

Uhm, yes I would, because it's an adventure to see new fish and sea plants.

I think they will change for the better because there are so many more experiences. I love shipwrecks, so I probably will search for them.

Lack of Behavior Change

A few participants expressed that their interactions with the ocean would not change.

I don't think my interactions with the ocean will change at all because I don't generally enjoy being in the ocean.

I wouldn't go in more; I already go to the beach a lot, but maybe after this less. This is because I'm scared of jellyfish, and there are so many close to land. But this is my opinion, and others are probably different.

The last quote was said by a person had seen or been stung by jellyfish while snorkeling.

Summary

It was very common for students to express a desire to do more underwater photography after the SUYO! program. Some students had cameras, and were motivated to go more. Others wished that they had cameras so that they could take more photos. One student's family actually bought a camera because of their enthusiasm about underwater photography. Students wanted to share their

underwater experiences with others, and doing more photography was a good way for them to share.

Students expressed a desire to spend more time in the ocean after participating in the SUYO! program. However, this time spent in the ocean was not just focused on snorkeling and photography. It appears that positive experiences in the ocean encouraged a range of activities including more snorkeling, surfing, looking for new animals and hanging out with friends more.

Participation in the SUYO! program also led to some increasing attitudes of stewardship. Even though human impacts on marine environments were not discussed, some students naturally felt an inclination to look after the ocean more after first hand experience. This feeling of stewardship may come from an increased sense of connection.

Students were motivated to explore the ocean more after their snorkeling and photography experiences. Student's sense of adventure was fostered from their underwater explorations and they expressed a desire to go on more adventures.

Only a few students expressed the fact that they would go in the ocean less, again the same students before who did like interacting with the water and one who was scared of jellyfish.

5.8- Program Feedback

After they completed the program, students gave feedback about what their favorite part of the exercise was, as well as their preference for using photography or video in the future. Difficulties that they came across during the program were also discussed, and they answered the biggest question; did they have fun?

It's better than maths.

Identification of Favorite SUYO! Activities

Students discussed their favorite activity of the program. Many different categories came up in this section.

Swimming and Snorkeling in the Ocean

Swimming in a real ocean environment with fish was my favorite.

It was a great experience; the ocean swim was as well as the pool.

I like swimming around more than taking pictures of fishes.

The one time I got to experience snorkeling in the ocean, I got close to the shipwreck. This was probably the most fun.

Snorkeling, when I didn't get stung by jellyfish.

The snorkeling and seeing the fish and the stingray were my favorites.

Sharing The Photos

My favorite part of the exercise was looking at all the pictures taken by other students and videos too.

Yes! The most fun was the picture taking and analyzing.

I liked seeing all the pictures at the end.

Yes, I have had fun. The most fun I had was looking at them all afterwards.

Because when you're swimming in the reef, you can just see it and then it goes, but you got to like look at them.

I love being able to look at the pictures afterwards. And it is actually really fun.

Pool Work and Learning how to Snorkel

My favorite part of the exercise was learning how to snorkel at the pool because I had fun with my friends.

I liked going to the pool. I don't know why, but I just really did.

Just seeing all the animals and stuff.

I liked seeing all the fish and a big crab down the bottom.

Taking Photos

I had a lot of fun; my favorite was the photo taking in the water.

The part I enjoyed most was snorkeling and taking videos/pictures of marine animals.

My favorite part of the exercise was on the actual day when we were taking photos and swimming.

My favorite part of the exercise was taking the photos underwater.

Going to the Beach

Going to the beach! Getting away from the usual classroom environment.

Spending time at the beach with friends.

Going down to the beach and not being at school.

Identification of Difficult SUYO! Activities

The most difficult thing for students was taking good photos. They learned that underwater photography could be tricky because the ocean is constantly in

motion, and the underwater light is so different from what we experience in the terrestrial world.

> *The main new experience I had was taking the underwater pictures, because even though capturing the image we wanted was hard, it was interesting to see how they turned out later on.*
>
> *Taking the pictures.*
>
> *It's just like trying to get like a good photo because you can't see what's on the screen.*
>
> *And then it was sort of choppy the first one, so it was a bit hard to take photos.*

Enjoyment of Program

When asked if they had enjoyed participating in the program, almost all students replied that they had.

> *Yes! I had fun!*
>
> *Yeah! It's a good experience.*
>
> *I thought that it was really fun, and I would definitely do it again.*
>
> *Yes. It's fun and a great recreational activity.*

Discussion of Photographic Method

The design of the cameras that the students used made it easy to mistakenly take videos instead of still photos. Some students did so, and if a video was good enough, it was shown to the group. Thus, even though videos were not the

photographic method chosen for this research, students were able to give feedback on whether they preferred taking video, pictures, or a combination of the two. These comments will provide valuable for future research.

Video

Some students preferred taking video rather than still photos.

I prefer videos than pictures because when you take a video, you can see how the marine life acts and what it does, but a picture just shows what it looks like.

And if there's a school of fish, you can swim with them.

I would like to have taken more videos because there is more to see in a complete video than just a photo.

There's more to see in a video. A picture's just one still photo. It's good as well, but if you do video and you do it well, you can see that a lot over a couple of minutes.

I liked the pictures, because you can like see them, but I reckon the video's pretty cool because you get to see it as it is but you're not there, sort of thing.

Still Photos

Some students preferred taking still photos rather than videos.

Photos because they are clear, and I prefer photos.

You can get a shot of exactly how it is then, then take another one, rather than having a video and then just keep going, and it's not that clear.

I would have taken pictures because videos have too much movement, and a picture is a more concentrated subject.

I would have taken more photos and would like to go to different locations to take photos. I like taking photography because videos are too shaky.

I would rather take pictures to videos as I find them more interesting to look at.

You can't really print out a video and like put it up, whereas you can do it with pictures.

I would rather take pictures because they capture a memory in a second.

Both Still Photos and Video

Two students preferred a combination of photos and video.

I would have rather taken both.

I don't know. I liked the pictures because you can like see them, but I reckon the video's pretty cool because you get to see it as it is but you're not there, sort of thing.

Summary

Students enjoyed a wide range of activities during their participation in the SUYO! program. Although the majority favored snorkeling and taking photos, many described sharing their photos as being their favorite activity. Students also enjoyed the simple acts of swimming and being on the beach.

Students were divided as to which medium they preferred—video or still photography. They recognized that each medium has a number of positive and negative attributes, and they determined that the choice depended in the end on the subject matter and how they wanted to present it. One student thought that both media should be used because they portray the ocean experience differently.

Learning how to use the cameras in a very short period of time was challenging for the students because the ergonomics of the camera are not very good. Many students expressed frustration at the fact that they could not see the camera screen to review their photos while they remained under water.

Overall, the vast majority of students had positive reactions to SUYO!, and many said that they would enjoy participating in the program again.

Chapter 6- Teacher Themes

This chapter covers the interviews that were conducted with teachers whose classes participated in SUYO!. During these interviews, which took place after the program was completed, the teachers discussed their reactions to the program and their assessment of student reactions. In addition they offered suggestions for improvements that might be made to SUYO!

6.1- Teacher Reactions to the Program

The four teachers who were interviewed as a part of the research assessed their own reactions to the program, including a discussion of the challenges that it created for them. They also described how participation might affect them in the future.

In General

In general teachers reacted positively to the program.

> *It's a pleasure to participate. That's what we try and do with our academy; we give rich experiences for our science kids. I'm prepared to put in the time, so it's good.*

Teachers liked the fact that multiple fieldtrips and multiple class sessions were involved because this schedule allowed students to improve their photographic technique.

> *They got the chance to see their videos and photos, and the shots that worked weren't necessarily the ones that they thought might work. So the next time they went to the ocean they would be trying all sorts of different things that they hadn't had the opportunity to do because they didn't get that feedback from the first dive.*

One teacher expressed his new understanding of the organizational challenges

involved in an ocean excursion and mentioned the worth of seeing what students gained from the program.

> *Well, I got an appreciation of the amount of organization required for outdoor activities. I've done a lot of excursions, but swimming adds another level of difficulty of course. I thought it was worthwhile for me as a teacher to see what can be gained from this experience for the students.*

Working with and managing classes of high school-aged students in a mixture of environments (indoor and outdoor) was another challenge for teachers.

> *I think the biggest learning curve for me was dealing with these kinds of kids in those environments and seeing how well they responded to it. Also sitting here in the classroom, you've seen it's quite hard work, repetitive work, as you probably saw, in the computer lab [that was part of SUYO!].*

In addition ensuring student safety was a challenge for teachers.

> *I'm really conscious of safety because as a teacher you have to be. If one little thing goes wrong, they come down on you like you wouldn't believe.*

However, one teacher mentioned that safety was not so much of a concern because her students were competent snorkelers. This fact permitted to concentrate on the photography.

> *I liked the fact that I didn't have to worry about anything other than a quick reminder. They all know how to snorkel pretty well. Therefore, you could really focus on the photography and the meaning of the photography.*

After participating in the fieldtrips, one teacher mentioned that he does not appreciate the marine environment as much as he should.

> *I think perhaps we're all guilty of not appreciating the ocean. Because we've got such a beautiful ocean on our doorstep, we tend not to appreciate it so*

much; and I think it's nice for them [the students] to actually stop a little bit, pause and actually say, well that is really beautiful.

To Photography

One teacher described being surprised not only by the quality of the photographs that students took with inexpensive cameras but also by her newly developed ability to see positive aspects in even "poor" images.

I was actually impressed by the quality of the photos; I thought, you know, it'll be pretty pathetic, but I must confess I felt even some of the bad shots had artistic merit, so that was quite nice that aspect. I was surprised with the positive side of things.

Because the teachers were occupied with supervising students during the fieldtrips, only one was able to do any underwater photography.

Well, I didn't take any shots myself, so I would probably gain more if I'd actually taken pictures, but I was more focused on the management and supervision.

Nevertheless, in general, the teachers seemed to be interested in this aspect of the program.

I've been toying with the idea of how can I go about doing underwater photography— how should it be done.

I learned a bit more about the cameras, like [D] will say, it would have been great to have some more go's with the cameras after we'd took the photos.

Another teacher bought an underwater camera for himself.

I went and bought my own camera, a new one.

After seeing how easy the program is to implement, one teacher considered buying cameras for his science department.

We've actually thought about purchasing a camera now, for the department. So I've learnt a bit more how easy it is.

Summary

Teachers, who in general responded positively to SUYO!, discussed the challenges involved in participating in the program—for example, the management of large groups of students who were snorkeling.

Additionally they discussed their reactions to the photography component, mentioning that they were surprised and impressed by the quality of the images taken with the inexpensive cameras. Even though only one teacher was able to take photos himself, participating in the program inspired the group both to start doing their own underwater photography and to consider encouraging their schools to purchase cameras.

6.2- Teacher Comments About the Students

Teachers talked about the students' good behavior during the program and about how their attitudes changed for the better. The teachers also discussed how the program provides a positive learning environment that resulted in greater awareness of the ocean.

Behavior

The Balcatta teachers in particular expressed their beliefs about students' earlier interactions with the beach and ocean.

Most of these guys, the beach is somewhere they might go sit on the sand and sun bake, once or twice

Yeah, not a place that you have a party.

Yeah, just go down on a summer's day and maybe eat some Maccas [McDonalds] or whatever and stick a toe in the water and go on back.

Chill out.

In a positive development, teachers mentioned that student behavior improved while they were on the fieldtrips. Some teachers were surprised by this change.

Getting them to try and curb their language is difficult at school. But take these guys out, and they are well behaved. They seem to forget the majority of their swearing.

Balcatta SHS teachers, who had believed that student behavior would be a problem, were particularly surprised that their students were actually quite well behaved and engaged.

They were very different. For me, I've had mainstream outdoor rec classes, and their behavior is like you're still in school in the classroom a lot of the time. Whereas our guys, the ones that you thought were going to muck up, they didn't.

The Balcatta teachers believed that the students who got the most from the program were the ones who had rarely or never gone into the water because they had feared doing so. A positive result of SUYO! is that most of these students overcame their fears.

I think they [the participants who had never snorkeled before] probably benefitted the most. The kids that had never done it before, the likes of [J], [C], [K], those guys, really enjoyed it. The first time we went out, were quite apprehensive about it.

So they would look—and things like that. Like even when [C] didn't do it, he actually hadn't been in the water in four years. But he learned something about this fear, for even though he didn't go in again, he made a conscious decision he didn't like it, and he faced the fear and he faced it the first day.

In addition, the Balcatta teachers discussed the benefits of having students who had previous snorkeling experience swim with those who had never snorkeled before.

For example, according to teachers, new snorkelers were generally more enthusiastic about seeing the undersea life than the experienced snorkelers were initially. However, after a time the formers' enthusiasm spread to the latter.

[First time snorkelers] caused students who have snorkeled a lot to actually pause for a bit and actually start to appreciate what they're looking at rather than swimming straight over the top of it.

One teacher elaborated on the relationship between snorkeling experience and appreciation of the ocean.

I thought it would have more affect on the kids that never snorkeled before, and it probably did have a big affect on them because for them it was probably quite confronting not having swum. But in some respects the kids that have probably been in the ocean the most, they probably get blasé about it. They don't stop and pause and actually appreciate what's around them. So I think it has an impact on even the kids that are in the ocean a lot. Those that had seen it and have snorkeled a lot actually paused for a bit and actually started to appreciate what they were looking at rather than swimming straight over the top of it. So there are two different aspects here.

Moreover, teachers thought that students would most likely talk with their parents about the experiences that they had had in the program.

Because these kids are already in a marine program, they're kind of on that fine edge of caring about the ocean as well, but I envisaged that they would more than likely have gone home and talked about what they've done with their parents.

The South Fremantle teacher was interested in the students' reaction to the painful incident with a swarm of jellyfish.

The good thing is we all had a laugh about the jellyfish stings the following Thursday, and they all said, "I had the worst one, yes, no, I did not," you know. But there was a bit of fun there too.

Learning

Teachers discussed the things that students had learned from participating in the program.

Of course students learned swimming and snorkeling skills.

There's two lots of things we're doing here today, and one of them is practicing your dive [snorkeling] skills. The second thing is you've got to use those water-based dive skills [in the ocean with cameras].

Students not only learned about underwater photography but also came to understand that taking pictures gives them a focus for their underwater experiences. This finding is mirrored in the student data.

I think they learnt a little bit about underwater photography. It actually gave them a focus. They learnt a new medium, if you like, and it fostered and facilitated the program we're already doing.

In addition, teachers described the practical skills, in particular first aid, which students acquired from participating in the program.

> *Being able to do first aid when things go wrong. That could have beautifully led into the next term subject material. We're going to talk about first-aid for jellyfish and all that sort of stuff.*

Students enjoyed "doing things" (experiential learning) more than reflecting on and discussing their experiences.

> *The type of student that we've got enjoyed the actual doing things rather than sitting down and reflecting on it and stuff.*

Teachers believed that this type of experiential learning was best for their students, who live mostly in the present moment.

> *Their world is what's immediate for them.*

The Leeming SHS teacher emphasized that the primary motivator for kids was "having fun."

> *They're still kids. Their prime motivation is to have fun.*

This having-fun attitude worked well with the SUYO! Program.

> *If you don't provide them with a totally fun experience, it's too bad, but the fact is that this [SUYO!] lends itself to that. They can't help but to have fun because they all want to genuinely be in the ocean anyway, so that sort of happens, which is nice.*

Attitudes

Teachers discussed how student attitudes evolved during the program and in general were pleased that the changes were positive.

At first, one teacher thought that the SUYO! would not engage students, but after she saw them enjoying snorkeling, she changed her mind.

> *Initially I thought they engaged shallowly, but then once they got into it, they really enjoyed it. So it's like anything new, kids are, you know, kind of easy come, easy go, don't take things too seriously; but once we got into it, they were really quite into it, I thought.*

It was obvious to teachers that students really enjoyed the snorkeling part of the program.

> *I thought it was positive. The kids were very enthusiastic about it, and they loved the snorkeling.*

Students developed more awareness and confidence.

> *I mean, you're not going to broaden their horizons into like what we were just talking about, the community and stuff, but it's certainly going to develop confidence and open their immediate world to another world basically.*

Especially important in particular for the Balcatta students, who come from difficult backgrounds, is the fact that the outdoor activities help instill positive values.

> *It instills positive values with them, when a lot of their values are quite negative, and their attitudes are quite negative.*

A teacher mentioned that one of the students who was normally aloof connected better during the program.

> *I thought, you know, with students crashing around doing this, how do you feel about this? I was really surprised, once we got into it, and it helped that you and I were enthusiastic. Here's a classic example: He [one of the students] can fall off the rail pretty easily, but he's really engaged with the ocean. This gives him a hang-on-to school point, and so the more things we*

can do for the kids like him, the nicer a person he's become. He's happy to help because he's got a discussion point as well. It's common ground.

Moreover, a student who was often negative in class made a positive comment while participating in the program. His teacher acknowledged that this kind of comment was rare for him.

And someone that normally wouldn't make positive comments, made a positive comment.

Being outdoors in a new environment broke down barriers between students and helped them bond.

It's great to put kids like this that are very secure in their little zone at school, even the toughest kid at school, in an environment, and if they're not used to, and it breaks down barriers. We noticed the kids bonded really well together.

Working as a team [snorkeling buddy teams] was beneficial for the students.

And little things like having to go with a buddy, because you can't just go off by yourself and say, "I'm going to be by myself, I don't need anyone," because you just can't do it. You find most kids no matter how tough they are, especially because they're not usually that confident at that age, are quite happy to go with that buddy rule. It's good for these little tough kids and that, they're all "I don't need anyone," to have to stop and think of that. Its also good for kids that are really tough thinking to think of other ones.

From their direct experiences in the ocean, students gained a better appreciation of marine life.

I think those kids now probably have a greater appreciation of what's down there because they've looked at it a bit more closely for themselves.

I would say it would have an impact, and it would vary from kid to kid how much of an impact it would have, but any experience like that where the kid's enjoyed the experience would have an impact. They seem to get a lot out of looking at other people's photos and their own images. This can only help their appreciation of the environment.

I don't know to what extent [changed student attitudes] but I think the key thing gained is an appreciation of the environment.

The Balcatta teachers also noticed that after the fieldtrip some students were talking about conserving the sand dunes. This discussion of environmental stewardship was rare among their students.

Awareness

Teachers perceived a change in student awareness of the environment and of how humans affect our natural surroundings. Interestingly, one teacher also mentioned that students profited by becoming more aware of the work of scientists.

I think that's just made them a bit aware that it's their environment.

Definitely increased awareness, but I think for some, definitely an increase in respect. I heard one of the kids say something to someone who went to do something damaging to the environment. They said, "Oh, you shouldn't go in the drain because you'll damage the ocean." The kid actually said that because they'd obviously heard us say it or from another source; but without their realizing, they'd actually become conscious of the environment.

One of the teachers reiterated a theme that emerged from the student data—that this experience opened the students up to an entirely new world.

Some of them didn't realize that there's a whole other. I think they actually learnt, not so much that this is a starfish or this is this. They learned it's actually a little bit more of its own world down there.

This teacher believed that once students became aware of the underwater world, they could not forget it.

> *Now I reckon they'll look at the ocean thinking, "Wow, remember when – what's under there?"*

Students also gained an awareness of and appreciation for the varied physical conditions in the ocean.

> *It was a shared experience. Sometimes what you expect is not what you're going to get. So that was good too, and we discussed that. You know, you go in the ocean, you think you know the conditions; you think you know what's going to happen. There might be a massive little current, or there might be a smack of jellyfish, but you never know until you get there.*

One particularly engaged teacher pointed out that participating in SUYO! allowed students to observe how a scientist works.

> *Basically gave us a fantastic opportunity for extension for our science academy kids and a great opportunity for them to look at research. I think it's nice for them to see how the scientist is working in the field, but it really comes down to their individual take on it whether it has an influence overall.*

Summary

Teachers who described student behavior prior to and during SUYO! were pleased that behavior improved while students were participating in the program.

In addition they agreed that both new snorkelers and experienced snorkelers gained from their explorations with cameras. They applauded the interactions between the two groups and mentioned that some of the former overcame a fear that they had had of being in the water.

Teachers also reflected on how well the experiential education part of SUYO! comports with the way in which their students learn best. At least for these students, who live mostly in the moment and who are motivated by having fun, that portion of the program was particularly engaging. Teachers also listed the skills that the program encourages—swimming, snorkeling, underwater photography, and first aid—and noted that some of the students were using these skills for the first time and that some overcame their fear of being in the water.

Teachers discussed student attitudes, agreeing that they gained confidence through interacting with the ocean and being able to successfully negotiate a new environment. Additionally the ability to work in teams helped instill positive values and attitudes; even "tough kid" barriers were broken down.

Like students, the teachers talked about the new underwater world that participants discovered. They noticed that the students' awareness of the ocean environment grew, and teachers believed that they would emerge from the program more conscious of human impacts on marine life. Another teacher discussed the benefits to students of participating in an academic research program that showed them how scientists work.

6.3- Teacher Advice About the Program

This section lists the suggestions that teachers made for improving SUYO!.

Teachers found much valuable in SUYO!, and they were excited that an in-school, underwater photography program could be completed successfully.

> *It was a hugely valuable experience, because as I said because it introduced me to how you could actually bring the underwater photography in as a program with you.*

However, teachers did believe that the program could be improved.

> *You have a good program, but it needed tweaking.*

Engaging the Students

Teachers saw that students were more engaged with some parts of SUYO! than with others.

> *I thought it was positive; kids were very enthusiastic about it; they loved the diving.*

However, a teacher pointed out that students need to be re-engaged quickly after the fieldtrip is completed because once they return to the classroom for computer work, some tend to lose interest.

> *I think they enjoyed it and engaged, but I think the way it was structured, they sort of switched off before the program had finished. It would be good to reorganize it.*

When students were distracted from their computer work, it became particularly important for the researcher and teacher to work together to get the discussion back on track.

> *Sometimes they need a little bit more direction. You were really good when you were doing the PowerPoint, and the week that I was there, you could see they were going off track a little bit. So you started to enlist there, and then you asked a couple of other questions with key kids, and that was exactly the right thing to do from your perspective so that you can actually, without telling them, you can actually draw it out of them. That was good.*

The task of choosing their favorite photos was very accessible for students, who are used to a virtual world and who make visual choices all day long.

> *You tell them to pick their favorite photo. The task is very accessible for them.*

Despite the fact that the cameras were inexpensive and low quality, teachers enjoyed the photos and thought that even the blurry images were artistic and effective at engaging students.

Well, you saw the kids that said "I've got a $400 camera; it's going to do a much better job." In my opinion this was not true. And my perception is you're not going to do the whole hog and spend thousands of dollars on quality underwater camera work. So if you are not trying to get the up close, super-fine, detail beautiful shots, you're almost better off with the artistic sort of shots—shots that have a bit of blur and movement and so on.

Teachers mentioned the importance of the researcher being enthusiastic, knowledgeable, and engaged.

You've got to show enthusiasm and commitment, and once they picked up on that, they were into it.

Well, the kids are always pretty good but, you know, once they picked up that you really knew your stuff, they're like, okay, you know.

Improving the Program

Teachers believed that SUYO! could be improved by integrating it into a marine studies course. At the time, the SUYO! classes conducted at Busselton and South Fremantle SHS comprised marine studies courses.

I think you'd have to tie it in to a whole marine studies course or a marine science course. We do some marine science with our science elective kids, but it comes up later in the year. So it's a toss up because of the weather. It's the best time to do it, early in the year, but it doesn't quite fit in with our marine studies course. But I'm sure those kids will carry those experiences through to that course later in the year.

Implementing SUYO! as an introduction to a marine studies course would immediately engage students with firsthand experience in the marine environment before they even opened a textbook.

Look, I think it's a wonderful way to do. Like I'd use that every year as an introduction to a course on marine science or something like that because I think it's a fantastic way to engage the kids. You can't get a better way to engage kids then when they're actively learning in the environment that they're studying. It's got to be better than just opening up a book and saying, "Oh yeah, what types of the environment are we looking at in here?" and so on. I think it's a great way to look at it. I think it's had a fantastic affect on the kids—if we could tie that into a course of learning on the marine environment soon after that. So next year I'll probably look at our Year 10 science elective. I wouldn't do it with mainstream science kids. I think it's great as an extension activity. I would actually use this as like an introductory module and then follow that on with studies of the different environments.

Teachers also discussed the benefits of having linked the underwater photography experience to an excursion to the local aquarium. There students got an idea of which organisms they might encounter in the wild, and they were able to observe these organisms closely before they snorkeled with SUYO!

Teacher 1: Because there was even some of the same fish, those yellow with the black stripe, just bigger. They were a coastal fish, and they actually saw some of the same fish that they saw, but just a little bit bigger. It actually meant that it sort of tied it in. And I think they got more excited about AQUA [the aquarium] than what they would have if there was no snorkeling in the wild involved.

Teacher 2: It was a good thing to tie that into.

Teachers suggested that a touch pool experience would be especially helpful as an introduction to snorkeling with SUYO!. (These pools allow people to touch marine organisms in a controlled environment.)

Teacher 1: They loved the touch pool—half of our guys. Some of them just went, "Oh, yeah, no, I don't want to touch anything." But some of them were around it like five-year-olds, waiting for one fish to come past and get close enough so they can touch it. So that was really good.

Choosing the Age Group

Teachers gave advice about which age group would be best suited to SUYO!

Some believed that younger students should be involved.

I would do it definitely even with Year 6 and 7. I could really see some 6s and 7s that don't achieve getting something out of that. That could actually impact on the way they're actually growing. That's a real vulnerable stage of their learning.

Even with these younger students, the teachers recommended that the program be implemented at the beginning of the term.

It's a great settling activity. You know, it's a great activity to start back at school. And again the same with 6s and 7s, they're off task, just finishing their summer holidays.

However, the teacher from Leeming SHS wanted to run the program with both Year 10s and Year 12s.

I want to do it with our Year 10s. If you had my Year 12 group, you'd say exactly the same.

Continuing the Program

All the teachers would continue the SUYO! program in following terms. The teachers from Leeming SHS and South Fremantle SHS would make some modifications.

Balcatta SHS: Teachers at Balcatta were enthusiastic about the program and would continue it essentially unchanged.

South Fremantle SHS: Even though she mentioned that the learning curve was challenging, the South Fremantle teacher would run the program with only a few changes.

> *So yes, I think it was great. And there's something I'm going to do again. I'm not exactly sure how we're going to go about it.*
>
> *I would definitely like to do this again. That was a good Year 10 module. I think it needs more than the four lessons you've got initially listed down. In fact I would go so far as to go to two sites, then another two sites.*

Leeming SHS: The teacher from Leeming SHS was particularly enthusiastic about the program and in fact did run it successfully the following year on his own.

> *Certainly, I'd do it again. I think it's great for the kids and a lot of extra work for me, but its part of our brief.*
>
> *I'm keen to set it up as like a module that we do every year because I thought it was a worthwhile experience. Having gone through it once, I feel with a little bit of input we could run it again quite easily. You don't have to necessarily be involved. We need some equipment, but apart from that having gone through it once, I've got the organization skills I reckon to be able to work through it myself.*

Using the Program in Other Classes

Teachers believed that SUYO! could work with other courses.

> *The potential is unlimited. Because like you say, you can actually make it [the applications] really quite complex.*
>
> *I guess it's just another bit of ammunition, well another aspect of our science extension course I can offer on a regular basis.*

A teacher believed that the photographs alone are a good teaching tool.

> *As you say, we've got the images that the kids can actually use again when it comes to the marine study course.*

Summary

The teachers both praised the program and the researcher and offered suggestions for improving SUYO!.

The teachers emphasized the need to engage students with the computer as soon as possible after the fieldtrip so that they would remain interested in their tasks. The teachers mentioned that they worked well with the researcher to accomplish this goal and pointed out that his enthusiasm and knowledge of the subject were important to the success of the program.

Teachers also discussed the advantages of preceding SUYO! with an aquarium visit and of including multiple fieldtrips to the ocean. In addition they advised that even younger students could benefit from participation.

All the teachers were pleased with the outcomes of the program and expressed interest in continuing it in subsequent years. They also recognized that SUYO! has potential to be adapted to a variety of classes and thought that the experience was very valuable overall.

Chapter 7- School Quantitative Results

This chapter describes the quantitative results collected from 29 students—the number who completed and returned both the demographic survey and the pre- and post-attitude/intention to act questionnaire. This subsample comprised students from Balcatta SHS, Leeming SHS, and South Fremantle SHS.

The teachers of these students were the most motivated and therefore took strong ownership of the program. Their enthusiasm resulted in more students returning completed forms.

7.1- Demographic Information

Because the main focus of the thesis is qualitative assessment, the demographic information presented is purely descriptive. In the future, a more in-depth analysis can be done by breaking down the data to discover more complex relationships among variables.

Results

This section presents purely demographic information for the subsample of students.

Demographic Summary

62% percent of the students were female, and 38% were male. 45% were 14, 27% were 15, 21% were 16, and 7% were 17. Most attended Leeming High School, where they were science students who had volunteered to participate in SUYO!. South Fremantle students were part of a marine studies course, and Balcatta students were part of ACCESS—a secondary school engagement program aimed at helping non-university bound students become work ready.

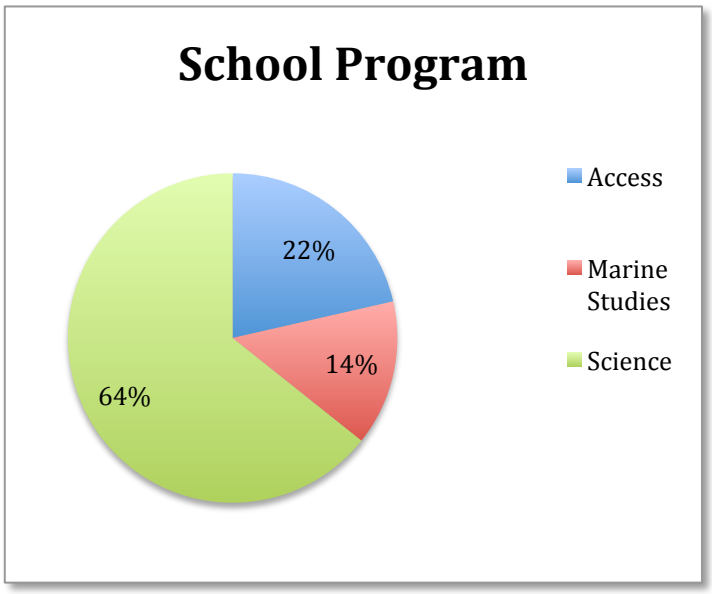


Figure 16. School Program

Leeming and South Fremantle SHS draw from higher income communities, and Balcatta SHS serves a less affluent population. Most student respondents planned on attending a university or TAFE institute when they graduated from high school. The largest percentage of the parents of respondents held either a university or TAFE degree. The education level of parents was varied among all the schools.

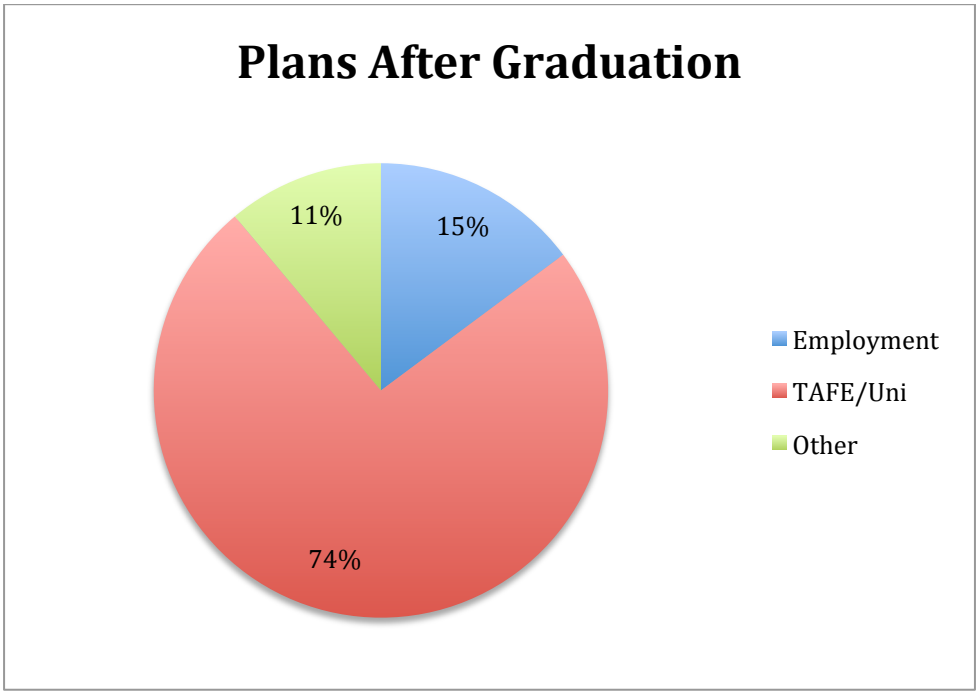


Figure 17. Plans After Graduation

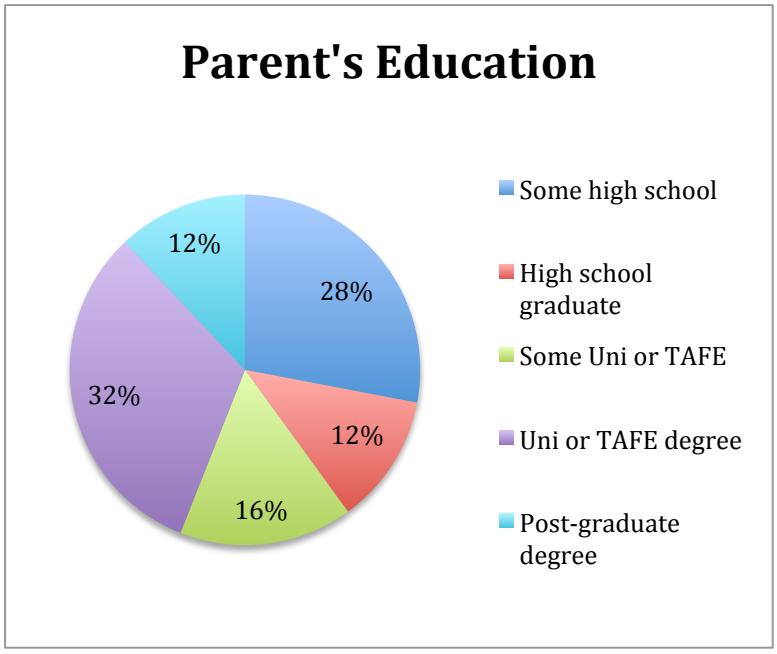


Figure 18. Parent's Education

The majority of students had either rarely or never snorkeled. Although students spent varying amounts of time at the beach each month, most did go there on a regular basis. A majority of students (62%) did not participate in watersports (surfing, swimming, etc.) as their favorite activities.

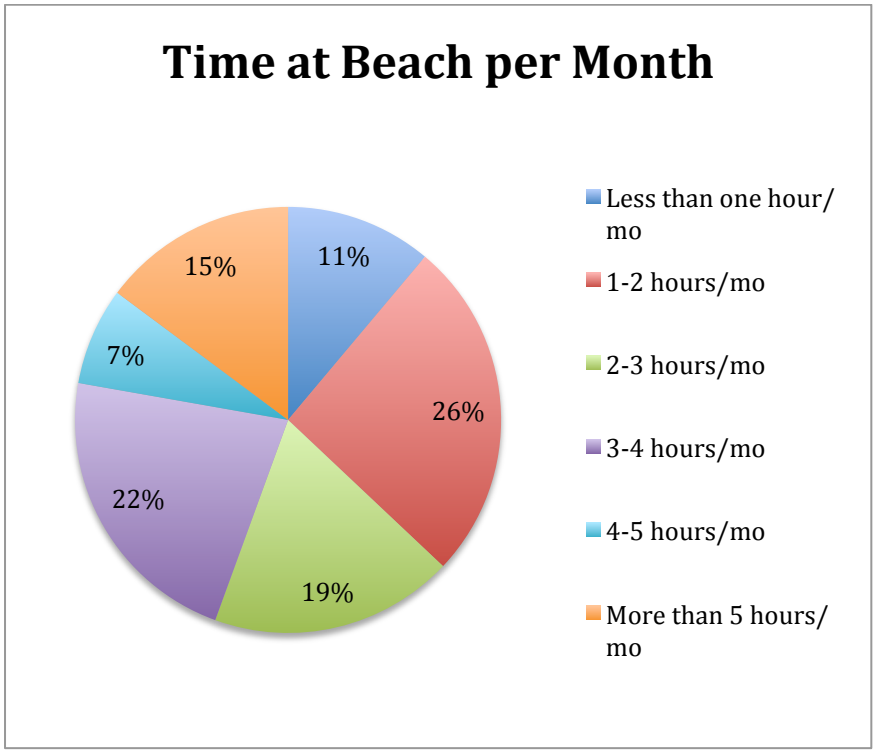


Figure 19. Time at the Beach Each Month

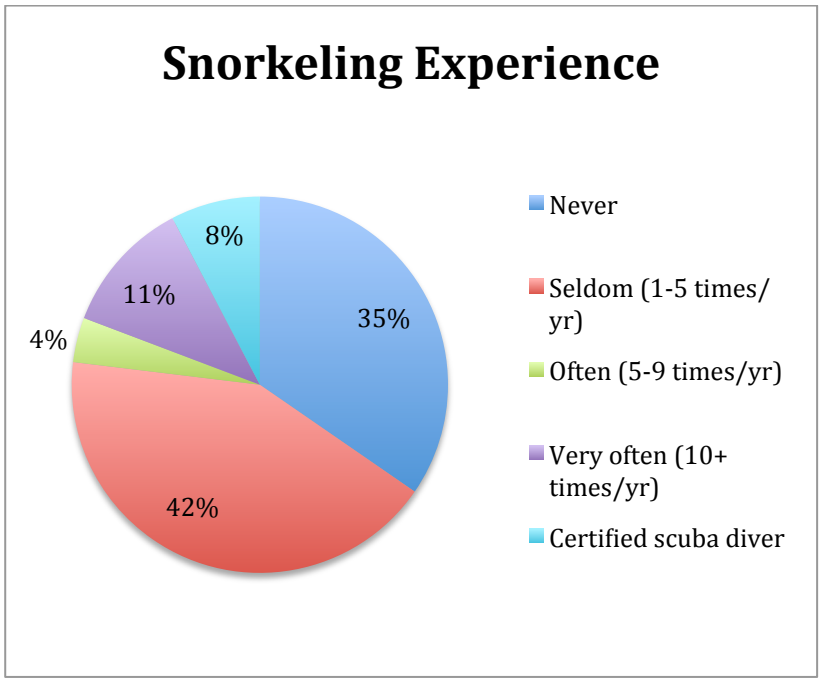


Figure 20. Snorkeling Experience

In general neither students nor parents of students belonged to environmental groups. A very small percentage (7%) of their parents participated in environmental groups while fifteen percent of students said that they are part of an environmental group.

7.2- Attitude and Intention to Act

This section describes the results of the pre- and post-attitude and intention to act questionnaires returned by the 29 students. As mentioned above, this thesis is focused primarily on qualitative data and interpretation, not on quantitative data. Therefore, the results presented in this section should be considered supplementary and indicative only. Nevertheless, the quantitative data do point to an interesting story. Some of the findings reinforce prior research, and some challenge it.

In Stepath [2006], for example, similar questionnaires were completed by a sample size of 320 students. However, a sample size of 29 is not a limiting sample size when testing for statistical differences within the sample.

Results

The table below shows the statistically significant differences between the means calculated for the answers in the pre- and post- questionnaires paired samples t-test was run to ascertain if there were any significant differences between the pre and post answers. Eight questions demonstrated significant differences in the answers.

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Living near the Indian Ocean makes me realize its importance	4.52	29	1.379	.256
		3.69	29	1.628	.302
Pair 2	Ocean animals need my help	4.93	29	1.163	.216
		4.03	29	1.742	.323
Pair 3	I can do things to help the ocean	4.66	29	1.446	.269
		4.03	29	1.636	.304
Pair 4	I can change what I do if it harms the ocean	4.79	29	1.398	.260
		3.86	29	1.597	.297
Pair 5	I will plant trees to help oceans	4.55	29	1.404	.261
		3.86	29	1.807	.336
Pair 6	Pollution should be controlled	5.48	29	.911	.169
		4.97	29	1.295	.240
Pair 7	Humans can change behavior to help oceans	5.07	29	1.067	.198
		4.00	29	1.753	.325
Pair 8	Humans need the oceans for survival	5.24	29	1.023	.190
		4.48	29	1.503	.279

Figure 21. Paired Samples T-Test Results

The table below shows the significant results of the Wilcoxon signed-rank test. The Wilcoxon test was used because when the data were analyzed to ascertain whether the data were normally distributed using Kolmogorov-Smirnov and Shapiro-Wilk tests (Field 2009). This test compares the scores in a sample to a normally distributed set that have the same mean and standard deviation as the sample. A non-significance result ($p > .05$) shows that the data is not significantly different from a normal distribution. However, if the test result is significant ($p < .05$), then the data is most likely not normally distributed (Field 2009). From the SUYO! data, only one pre- and post- questionnaire response was normally distributed. The rest of the data were not normally distributed. Therefore another test was necessary to test for significance.

The Wilcoxon signed-rank test was chosen because it is appropriate when there are two sets of scores to compare from the same participants that are not normally distributed. This test takes into account that the data violates the assumptions of the dependent t-test (it is not normally distributed) (Wilcoxon 1945). The Wilcoxon-signed rank test is similar to the dependent t-test because it is based in the differences between scores in two different conditions that are being compared. The differences in these scores are calculated and then ranked. During the Wilcoxon-signed rank test, the sign of the difference (positive or negative) is assigned to each particular rank. This is essentially the non-parametric equivalent of the dependent t-test, and allows for the data (even though it is not normally distributed) to be compared (Field 2009).

Test Statistics[b]

	living near ocean makes me realize importance - Aliving near ocean makes me realize importance	ocean animals need my help - Aocean animals need my help	i can do things to help the ocean - Ai can do things to help the ocean	i can change what i do if it harms ocean - Ai can change what i do if it harms ocean	i will plant trees to help oceans - Ai will plant trees to help oceans	pollution should be controlled - Apollution should be controlled	humans can change behavior to help oceans - Ahumans can change behavior to help oceans	humans need oceans for survival - Ahumans need oceans for survival
Z	-3.189[a]	-2.637[a]	-2.233[a]	-2.418[a]	-2.392[a]	-2.041[a]	-2.956[a]	-2.489[a]
Asymp. Sig. (2-tailed)	.001	.008	.026	.016	.017	.041	.003	.013

a. Based on positive ranks.
b. Wilcoxon Signed Ranks Test

Figure 22. Kolmogorov-Smirnov and Shapiro-Wilk Tests (significant results)

Student Attitudes

- ***Students were less likely to believe that animals in the ocean need their help after their SUYO! experience compared to before.***

This response could be attributed to the fact that because the students were exposed to a relatively healthy ocean environment in which they had mostly positive experiences, they did not understand that populations of marine animals are under pressure. Apparently, although SUYO! achieved its goal of fostering positive attitude change toward the ocean, it did not improve students' knowledge about human impacts on the ocean. Students seemed to have completed SUYO! feeling better about the ocean, believing it to be healthy, and not realizing that it is under pressure. Perhaps for these reasons, they decided that marine animals do not need their help.

- ***Students became less likely to believe that living near an ocean was a factor in making them realize its importance.***

This response could be attributed to the fact that students who participated in SUYO! developed the understanding that they did not have to live near the ocean to recognize its importance

- ***Students became less likely to believe that humans need the ocean for survival.***

This change in attitude is difficult to explain, especially in light of the previous finding. However, during the program no information was conveyed to the students that minimized the dangers facing the oceans and what those dangers mean to human health and survival.

- Students became less likely to believe that pollution should be controlled.

Students might have relaxed their attitudes towards environmental problems because the ocean environment that they experienced was healthy. Of course these

students could not know how the ocean health has deteriorated. To them the ocean was filled with new and interesting animals, and they did not understand how many more organisms that they would have seen decades ago. Also students did not experience polluted waters or discover any major human impacts during their snorkeling journeys. In fact, one student was pleased that "human junk" (the shipwreck) was a home to a variety of marine organisms.

Intention to Act

- ***Students became less likely to believe that humans can change their behavior to help oceans.***

- ***Students became less likely to believe that they could change their behavior if it harmed the ocean.***

These two statements demonstrate that, after participating in the program, students felt less capable of making a difference in their behavior or in the behavior of others. This change in attitude clearly shows the need to educate students about their abilities to alter behavior and thus to have a positive impact on the oceans. These responses make clear that students do not feel empowered to help the oceans.

- ***Students became more likely to believe that they could not help the oceans.***

This response may have been due to the fact that students were not told how to help the ocean. For example, they did not learn about political activism or citizen science. Although they experienced first-hand engagement and exploration in the ocean and became more conscious of and positive toward the marine environment, they obviously lost confidence in their ability to foster change.

- ***Students became less likely to plant trees to help the oceans.***

This statement is another demonstration of an *intention to act with negative responsible environmental behavior*. Again, it could result from students

experiencing a relatively healthy ocean environment and therefore believing that they did not have to take positive action.

All the significant quantitative results seemed to show that the SUYO! program had the opposite effect to what was intended. That is, the students' attitudes and intentions to act became less favorable with respect to the need for care of the marine environment. This negative outcome is something of a mystery especially when compared to the positive outcome revealed by the qualitative data.

Chapter 8- Discussion

Research Question: The purpose of this thesis is to determine whether underwater photoelicitation is feasible and effective as a methodology for experiential marine education within the context of community and school-based educational programs.

Tell me, I forget.

Show me, I remember.

Involve me, I understand.

- Ancient Chinese proverb (anonymous)

This chapter, which discusses the findings of the research in light of the current literature, contains four major sections: awareness of the marine environment, change in attitudes, sense of connection to the marine environment, and intention to act. In these sections, SUYO!'s respective impact is discussed. The subsequent sections discuss the following: modifications that could make the program more effective at encouraging pro-environmental attitudes and behavior; benefits to the research of combining two distinct fields (ecopsychology/deep ecology and conservation psychology); limitations of the research; and ideas to be implemented for future programs.

8.1- Model of Underwater Photoelicitation

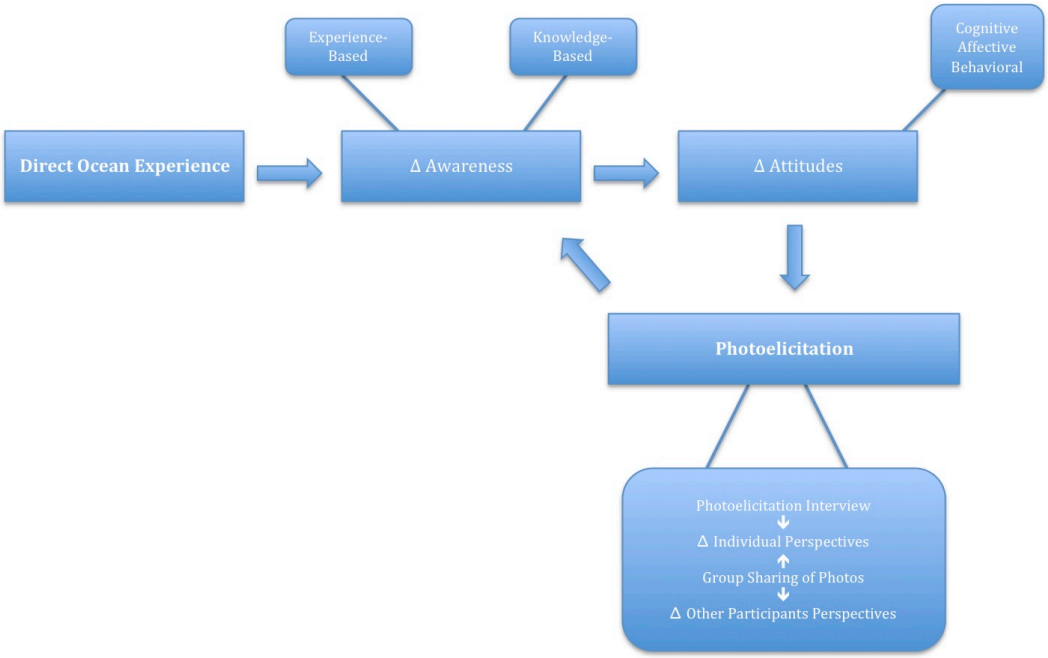


Figure 23- Model of Underwater Photoelicitation (UPE)

The underwater photoelicitation model above (UPE), which emerged from the qualitative and quantitative data, summarizes how underwater photoelicitation affects awareness of, perspectives on, and attitudes about the marine environment. It is an attempt to create a cohesive and comprehensive understanding of the learning processes underlying underwater photoelicitation.

Similar to the action research and experiential learning cycles that are described by John Dewey, this model draws on the Theory of Planned Behavior (TpB) (Dewey 1938; Ajzen 1991). As with the process of underwater photoelicitation, both the experiential learning models and the action research models are cyclical in nature. Experiential learning is discussed in Chapter 2 - Theoretical Framework.

Definitions and Usages in the UPE Model

Δ: This symbol indicates 'change in'. For example, change in attitudes.

Direct Ocean Experience: In this instance direct experience means snorkeling, exploring, and taking photos in the marine environment. The initial major intervention, direct experience can increase awareness of the ocean world. Some participants' attitudes shifted following these activities, possibly because they may have felt more comfortable in or connected to the ocean after their first-hand experiences.

Photoelicitation: The photoelicitation process includes both individual and group work with photos taken in the marine environment. Through this process, which is the second major intervention, the participants gain new perspectives that can increase their awareness. Perspectives are a mental view or prospect (Webster 2012). When participants view and discuss photos of the underwater world, they are exposed to new perspectives as they see the different ways in which the ocean is portrayed and hear the different observations that people have about their experiences.

In this study initial reactions to photographs were elicited from adults through individual interviews and from students through preparation of individual PowerPoint presentations of their chosen photos. Subsequent reactions to photographs were elicited from both adults and students through group discussions. Participants chose their favorite photographs from among the ones that they had taken and brought them to the group discussions. After participants gained a more complex awareness of and new perspectives on the marine environment through the analysis and sharing of photos, their attitudes about the marine environment were re-examined.

Awareness: To have awareness means to be cognizant or conscious of. It can be both experience- and knowledge-based. Experience-based awareness derives from exploring environments directly and observing and discovering new animals, plants, and rocks, etc. Knowledge-based awareness comes from the acquisition of information from an external source--textbooks, classrooms, internet, etc.--and in the

context of environmental education can mean knowledge of ecology and knowledge of how one can act with pro-environmental behavior (empowerment action strategies)

Attitudes: Attitudes are complex mental states made up of cognitive, affective, and behavioral (intention to act) components. Participants' attitudes are examined before any interventions occur. Participants then have the chance to re-examine their attitudes about the ocean after the two major interventions--that is, direct experience and underwater photoelicitation. First, they are re-examined after direct experience in the marine environment. For example, participants may feel more comfortable interacting in the marine environment after direct experience. Next, they are re-examined after participation in the photoelicitation process, after they have gained new perspectives and new awareness.

8.2- Awareness of the Marine Environment

Both of the SUYO! processes—direct experience and photoelicitation—increased adult and student awareness of the marine environment. This section describes how the increase occurred and why it is important for effective environmental education and the eventual development of an ecologic self/unconscious. Prior studies of direct outdoor experiences are discussed with regard to assessing their impact on increasing awareness of the non-human world.

Through Direct Experience

While both adults and students gained awareness of the ocean from participating in SUYO!'s direct experience process, the latter appeared to enjoy a bigger gain. This difference can be attributed to the fact that, although all the adults had snorkeled before, some of the students had not. These students were, therefore, exposed to an entirely new world underwater. In contrast most of the adults were frequent ocean users and had been snorkeling on multiple occasions. Some even stated that they visited the ocean every day. However, few of the adults had taken

cameras underwater. This new experience helped them expand their awareness of the ocean as they observed and photographed animals and features, many of which had previously escaped their notice.

Although many of the students had some snorkeling experience, like the adults, few had engaged in underwater photography. Interestingly, prior to participation in SUYO! the students displayed a real lack of understanding about the underwater world, believing that it contains little life and consists mostly of sand. However, when they experienced the ocean directly and with focus, they discovered its diverse ecosystems. As their awareness grew, they recognized the "whole new world" that exists underwater. (Of course this awareness came only through observation and not through any ecosystem/biology knowledge-based understanding.)

Adult participants seemed to value having a structured task to accomplish while snorkeling. Both adults and students mentioned that they enjoyed using the cameras as a focal point of their underwater journeys. Interestingly, having cameras apparently encouraged participants to expand their explorations. Perhaps because they wanted to take good photographs, they were motivated to swim widely, searching for intriguing shots that they could share in the group discussions. This motivation to explore, of course, led to an awareness of a larger area of the ocean.

Meta-analyses of marine wildlife tours have shown that participating in these experiential programs leads to increased awareness of marine animals and their behaviors (Zeppel 2008). This result has been seen, for example, following direct, close contact with marine wildlife, such as dolphins or nesting turtles. A similar increase in awareness is found in this study, during which participants actively engaged with marine animals in their natural habitat.

Ecopsychology and deep ecology research focus on promoting direct experiences with nature. According to ecopsychologists/deep ecologists, developing awareness of the non-human world through direct experience is a critical step in fostering a sense of connection (Harper, Carpenter et al. 2011). Ecopsychological studies that explore the effects of direct experience on participant awareness focus mostly on environmental identity (ecologic self), affective connections and the sense of well-being that is often fostered (Hinds and Sparks 2009). Although there is a dearth of ecopsychology research about increasing awareness of the physical and biological aspects of the non-human world, many studies document both changes in

affective and spiritual responses and the development of a sense of place (the effect on the psyche) (Roszak 1995; Davis 1998; Harper, Carpenter et al. 2011; Hinds 2011; Snell and Simmonds 2012). These aspects of direct experience are discussed in the "sense of connection" section of the discussion.

Conservation psychology, which is often knowledge-based, focuses on gaining awareness of the non-human world through direct experience and is used within the context of creating attitude and behavior change (Clayton and Myers 2009). Although SUYO! developed knowledge of the marine environment through direct experience, it had no component that identified the plants and animals that participants found or that described their role in the ecosystem. Of course simple knowledge of the existence of marine life is important; however, in order to foster positive attitudes about the creatures it is apparently necessary that information on the biology and ecology of these organisms be presented. This conclusion is described in the "modifications" section of the discussion.

The direct interaction with the ocean was successful in increasing participants' awareness of the marine environment. Moreover, both adults and students reported that they were enthusiastic about SUYO! I believe that this engagement and enthusiasm, which encouraged participants to become more aware of the marine environment, are qualities necessary to the success of experiential marine education.

Through Photoelicitation

While both adults and students gained awareness of the ocean from SUYO's photoelicitation process (both the individual and group discussions), the former appeared to enjoy a bigger gain. The difference can be attributed to the fact that the adults' vocabularies and ability to analyze photos were more developed. In addition it was easier for adults to initiate and continue a discussion. All in all, sharing perspectives through photographs seemed to be natural and easy for the highly engaged adult groups. Although in general for the students, the discussion was more difficult, both the adults during their interviews and the students during their

PowerPoint presentations were able to successfully relive and reexamine their underwater experiences.

While engaged in these activities and in the group discussions, some participants noticed unexpected elements in their photographs. For example, a photograph that turned out blurry could contain a beautiful combination of light and color. Sometimes a participant took a photo of the seascape that came back unexpectedly showing the reflection of the water's surface or the appearance of streams of light. Revealed only through the photographs, the existence of these elements allowed the photographer to look at the marine environment from a new perspective that increased her/his awareness of its beauty. This result is demonstrated commonly in the literature; participants often develop new perspectives when they talk about their photos with the researcher (Harper 2002).

For me, one of the most interesting aspects of SUYO! is the sharing that occurred during group discussions. Earlier photo-based studies have documented the benefits of participants' presenting their photos to a group (Martin and Martin 2004). In addition teachers recognize that working in groups introduces students to new perspectives (Driscoll 2002). Often a member's comments either reveal a new way in which to see a photo or mention an element that had escaped the photographer's attention. In addition group sharing of photos has the benefit of exposing all participants to multiple perspectives and thus increasing everyone's awareness of the subject (Collier and Collier 1986; Thompson 2000; Parker 2009). This shared awareness is intersubjective in that it is has been constructed by a group of people who have shared their subjective experiences and have come together in an understanding about something or someone (Duranti 2010). These kinds of group interactions can enable the development of deep understandings and feelings of empathy between people (Gallese 2003).

The group sharing gives the photographer the opportunity to answer questions from people who have different perspectives. In answering these questions, the photographer uses the photo as a memory anchor—a process that is commonly described in the literature and that is one of the benefits of using photoelicitation for qualitative research (Harper 2002; Ibanez 2004; Loeffler 2004; Martin and Martin 2004). Participants who take photographs of their outdoor experiences are able to remember the emotions that they were feeling when they took their photos and can subsequently discuss these emotions with the interviewer. Other

benefits of group sharing include triggering community narratives and accessing collective memory (Collier and Collier 1986; Thompson 2000; Parker 2009).

In general the adult participants evinced the excitement that other studies have shown is common when people share photos of their own experiences (Loeffler 2004; Miles and Kaplan 2005). The adults were also aware that people perceive the world in different ways and have different ways of processing reality and framing the world. They enjoyed these differences and were highly engaged in the group discussion. Adults seemed to have stronger and more varied emotional reactions to photos and perceived more in them than did the students.

Although students were interested in seeing the photographs that their classmates had taken, they generally did not engage in the thorough discussions that adults did. I had more difficulty keeping the conversation flowing and found that I was prompting the students more often.

The photoelicitation process revealed that the adults overall seemed to have a more elaborate sense of how they perceived the marine environment and how they could use photography to portray it. Because their perspectives were not as developed as the adults, students expended more effort in forming their own perspectives on the ocean. This opportunity to form perceptions is another benefit of SUYO!. Although both groups increased their awareness of the ocean through the photoelicitation process, they did so to varying levels.

Overall the adults did a more thorough job analyzing the photos than did the students. Not surprisingly adults had developed a more critical eye and a more complex vocabulary. However, many adults had never examined their own photography from an artistic perspective, and this way of analyzing images was new for many. The differences between youth and adult examination of photographs does not appear to have been well documented in the literature.

Similar to the adults, students lacked experience in examining photography as an art form. Despite its prominence in the everyday life of young people, very few students in the study had formally studied photography. In addition most students had never participated in a photography project. This lack of experience was demonstrated in the way in which they struggled to express their ideas about the artistic elements in the photos. I had to help by offering a few examples of how they could describe their photos and by defining relevant terms such as composition, light,

color, rule of thirds, etc. Once I had done so, students were more willing to discuss the artistic elements of the photographs.

Initially students did not view photography as an art form; instead it was seen as merely a way in which to document social experiences. Approximately 40% of the students' photos were of each other interacting with the ocean rather than of the marine environment alone. Most of these photos depicted students snorkeling and playing in the ocean. Thus although the primary subject was another person, the marine environment played a large role in the framing of the image and in the behavior of the subject.

It should not be surprising that they students saw photography as mainly a tool for depicting social situations. More than 73% of online teens in America (most likely a similar percentage in Australia) use a networking website, and these websites are used extensively to communicate social situations (Lenhart, Purcell et al. 2010). For many teens photography is about sharing online the photos that they take of themselves engaged in fun or interesting activities (Livingstone 2008).

This finding partially mirrors a recent photoelicitation project involving high school students' experiences during an outdoor education program in New Zealand. Smith et al. (2012) found that during the outdoor program, students took a majority of their photos of other students. The researchers found that the students were focused primarily on socializing. Thus it is reasonable to suggest that in the Smith study, students also believed that photography is mainly for capturing social situations (Strack, Magill et al. 2004; Smith, Gidlow et al. 2012).

With SUYO! photos of other students also depicted their interactions with the marine environment. In addition direct immersion in nature gave participants new objects and experiences to photograph so that they could take engaging pictures without having to rely solely on social encounters. It would be interesting to study whether students would concentrate even more on photographing social interactions if they were on a terrestrial excursion rather than a marine excursion, where there may be more opportunity for socializing.

Although the adult participants seemed to focus less on photos of other people and more on features of the marine environment, the differences between the subjects of the two groups is not great. The fact that the students snorkeled and explored the marine environment in groups while most of the adults swam solo or in teams may explain why other people were a more common subject for the former.

The adults who did go on their photo excursions in groups often did take photos of each other. Therefore, using the methodology applied, I cannot conclude that students were actually more likely than adults to take photos of each other rather than of the marine environment. This phenomenon warrants further research.

Moreover, students may have concentrated less on the composition of their photographs than did the adults. Because the adults were allotted more time to explore, they may have spent more time trying to capture subjects that they felt warranted the effort.

Web 2.0, the current internet era, is much more interactive than was the web of the 1990s and early 2000s (Borland 2007). Rather than being "one-to-many," communication is now "many-to-many" (Roush 2006). Social media such as Facebook and Twitter and interactive content such as Wikipedia allow users to communicate and the web to evolve much more rapidly than ever before (Vickery and Wunsch-Vincent 2007). One of the benefits of SUYO!'s use of digital images is that these images can be uploaded to social networks; something that at least one student did during the program.

Moreover, technologies such as digital photography and video are increasingly being integrated into the education system. Digital storytelling, which uses media production to tell a story, has become a quite popular teaching technique (Robin 2008; Sadik 2008). All these tools, which are getting cheaper and easier to use, are highly engaging for students.

It would be no problem for SUYO! to incorporate the use of digital storytelling and social media as ways in which to spread awareness of the marine environment. In fact because they allow information (in the form of photos, videos, and stories) to reach so many people so fast, increasing environmental awareness is one of the most exciting prospects for these techniques. The capability of sharing experiences and media online expands SUYO!'s reach, for the shared information has the potential to inspire and motivate others to explore the marine environment. At the very least, family and friends who view uploaded photos can develop a heightened awareness of the ocean.

Through the photoelicitation process both adults and students also learned more about photography. Giving cameras to participants allowed them to discover and experiment with different techniques to get the best photographic results. After having a positive experience with photography during SUYO!, many participants

expressed the desire to do more photography in the future. In fact because of his positive experience with the program, the family of one student bought an underwater camera. Participants were generally comfortable with the photographic process—a result that is comparable with other studies in the literature (Harrison 2004; Wang 2006).

Viewing photographs of the underwater world brought to light aspects that participants had not noticed during their direct experiences in the ocean, and sharing these photos introduced new perspectives to both the photographer and the group. Thus the two activities succeeded in expanding the participants' awareness of the marine environment.

Skills

Teachers discussed the fact that many students improved their swimming and snorkeling skills during SUYO!. The more experienced students were able to instill confidence in the less experienced, who in turn infected the former with their enthusiasm.

Even though most participants were amateur photographers, they were not deterred from experimenting with the cameras and were able to get some amazing images. In fact, improving photography skills was one of the program's motivating factors. Other studies also show that while photoelicitation participants are often inexperienced photographers, they relate well to the technique and learn quickly how to take effective images (Beilin 2005; Miles and Kaplan 2005; Bignante 2010).

Most of the adults who participated the all-volunteer community program had an existing interest in photography and wanted to use SUYO! to learn underwater photographic skills. In contrast, only one of the school programs had volunteer participants. Therefore, most students had no choice whether or not to participate in the program. Nevertheless, virtually all the students enjoyed taking photos and improving their photography.

Living Through the Camera

Earlier research has reported that when participants in a photoelicitation study were asked to photograph terrestrial environments, some expressed concern about

"living through the camera"—that is, they feared that they would focus on possible shots rather than on just being present and enjoying scenes as they come upon them (Loeffler 2004). This concern was not raised during the current study. In fact, the cameras appeared to help participants concentrate on their underwater surroundings.

Possibly these different reactions result from the difference between land-based outdoor and underwater outdoor experiences. Participants in the former, who may be more relaxed about their explorations, can remain motionless to observe and become truly aware of an interesting feature of the terrestrial environment. They may believe that these first-hand observations will remain in their memories sufficiently well that looking at a photograph is not necessary for recalling the scene.

However, because swimming in the ocean requires participants to be in constant motion, they understand that they will soon have to move beyond any scene that they observe. They may therefore feel an urgency to capture it digitally as the best way in which to be able to recall their impressions. The camera thus becomes an instrument for capturing their memories of fleeting sights. In addition as participants swim around, they may be actively searching out features that will trigger their memories. In this way, the camera becomes an instrument for increasing both their interactions with and their awareness of the marine environment.

Upon completing SUYO! and becoming an experienced underwater photographer, a person may still become concerned about living though the camera. After engaging in a lot of photographic activity, she or he may desire to swim around *without* a camera and thus just live in the moment. My own evolution as an underwater photographer is a case in point.

Summary

For both adults and students awareness of the marine environment was increased through direct experiences in the ocean. Students who had never snorkeled before most likely sustained the most increase in awareness; however almost all participants encountered new animals and marine environments. The SUYO! findings mirror the literature dealing with direct experience in the marine environment (and the non-human world in general) affects awareness. The vast

majority of studies find that time exploring and learning about the non-human world increases participant awareness. SUYO! is a new educational technique that utilizes direct experience in the marine environment to foster an increase of awareness.

The photoelicitation process also increased awareness of the marine environment. Participants were able to share their experiences, share new perspectives, and share new discoveries that they had on their excursions. Although the adults generally had more thorough and enthusiastic group discussions and voiced more perspectives, the students also benefited from group work. SUYO! whose results conform to earlier photoelicitation literature discussing the technique's ability to increase participant awareness, provides a new tool for achieving that goal.

8.3- Attitude Change

How did direct experience and photoelicitation change participant attitudes so that they became more aware of the marine environment? As used in both the introduction and research methodology chapters, *attitude* is a comprehensive concept --"a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (Eagly and Chaiken 1993, p. 1). Because it is a term that encompasses so many different components, using it has been challenging and sometimes confusing.

In this research, "awareness" is defined as being gained through direct experience and knowledge, and "attitude" is defined as the way in which people feel about their direct experiences in the ocean and about new learning acquired through photoelicitation. (Both direct experience and photoelicitation lead to increased awareness.) The use of these definitions explains the reason that "attitudes" comes after both "direct experience" and "photoelicitation", in the underwater photoelicitation model,

Attitudes elicited from the qualitative data are associated with the ways in which participants felt about the ocean, about photography, about SUYO!, and about relating to one another while participating in the program. Attitudes elicited from the quantitative data are associated with the ways in which participants felt about the ocean in particular and the environment in general.

The positive attitudes fostered by participation in SUYO! are that participants were more excited to explore, that they enjoyed sharing photos, that they were more interested in learning, and that they had fun working together.

The negative attitudes that were expressed by participants are fear of the ocean (biophobia), a sense that the ocean does not need help, and an increased disinclination to believe that humans need the oceans for survival.

Both positive and negative attitude changes are discussed in detail below.

Both a sense of connection and an intention to act can be classified as attitudes. However, because of their importance to the goals of the current research, these two components of attitude are explained in more detail in the sections subsequent to attitude change.

Positive Attitude Changes (Qualitative)

About the Ocean

With underwater photography both adults and students gained a new way in which to engage with the ocean, and through this new activity, an increased excitement about experiencing and exploring the marine environment. Taking photographs and discussing them with others helped participants express and reflect on their attitudes about the ocean. The ability to reflect on previously held attitudes proved valuable for encouraging participants to think seriously about their relationship to the ocean**.** Because they were empowered to represent and share their experiences with cameras, any positive attitudes that participants already had about the marine environment were strengthened.

An examination of the adult qualitative data shows that although these previous attitudes about the ocean were apparently reinforced, few new attitudes were elicited. The adult participants already held well-formed attitudes about the marine environment. For example, prior to the program, many adult participants had a strong sense of connection to the ocean. This attitude is described in further detail in the following section. Other attitudes that they held were mostly positive and well developed over years of living by and interacting with the sea.

However, there were a few areas in which adult participants were able to examine, develop, and perhaps change their attitudes. For example, many of the participants expressed an increased desire to explore the marine environment. Having a new way to experience the marine environment through photography was empowering for many participants.

In contrast, many of the students had not spent much time interacting with the ocean, and by giving them the chance to do so, SUYO! provided them with new experiences. The experiences and the perspectives gained from photoelicitation in turn led to the students forming and describing new attitudes. The Balcatta SHS class, for example, had had the least overall experience with the marine environment, and the majority of them had never snorkeled. After doing so successfully, they stated that they felt safer in the water. This decreased fear was the most common attitude change described by students.

Participants also felt more excited about exploring new parts of the ocean and discovering new organisms and environments. This positive attitude about exploration is important for encouraging more interactions in the marine environment.

The effect of direct experience in nature on environmental attitudes has been widely studied, and the SUYO! results seem to echo most of the earlier research. Most studies find that time in nature leads to more positive attitudes about the non-human world (Bogner 1998; Dettmann Easler 1999; Mittelstaedt 1999). Experiential marine education studies also reflect these findings (Stepath 2006; Ballantyne, Packer et al. 2007; Scott 2007; Zeppel 2008; Stepath and Bacon 2010). Similarly, photoelicitation studies that focused on direct experiences in nature found that participants were able to express and develop their positive attitudes toward the non-human world (Carlsson 2001; Loeffler 2004). However, the effect that this attitude change has on behavior is open to question, and so far no studies have been done to discover either how long these positive attitudes last or if they lead to more pro-environmental behavior (see discussion in Chapter 3- Research Methodology).

Toward Photography

In the section above, I examine how the photoelicitation process changes awareness of the marine environment. The process likewise changed attitudes about taking photographs. The photographic experience levels varied among the participants, with many being relatively new to the skill (see also Skills above). Almost none had taken underwater photographs before, and after participating in SUYO!, participants generally felt more positive about photography.

Aided by their photographs, many of the adults were able to tell stories about why the ocean is significant to them. Moreover, adults were surprised when the group appreciated and enjoyed photographs that they themselves had originally judged as not good. The exercise brought home to these participants that, as with all artistic endeavors, differences exist in the way in which people respond to any one image. The groups, which were supportive of those members who thought that their images were of poor quality, made a point of discussing the attractive elements that they found in the photos. Many left the workshop with a more positive attitude toward their photography and their experiences. In this way, group sharing created a change for the better.

Group sharing of participant-taken photos has also been shown by researchers to empower previously disempowered groups. One photovoice study of rural Chinese women found that these women felt much more empowered when they were given cameras to document their lives and surroundings. (Wang and Burris 1994). In addition the ability to share their images and reflect on their meanings led to a more positive attitude toward photography and its use as a way to represent their experiences.

Adult participants had a similar positive attitude about sharing their photographs and experiences with the researcher during the individual interviews. This willingness to discuss a topic in depth and to take ownership of the conversation is one of the recognized benefits of auto-driven photoelicitation (Harper 2002; Ibanez 2004). Teachers were surprised that students also had the ability to recognize the positive elements in their images through the group discussion and the sharing of different perspectives.

In Student Relationships

The teachers appreciated the fact that the students were able to bond and work together as teams. They also thought that being outdoors had a positive influence on the students and that, as individuals and as groups, their attitudes were more positive during the excursions. Even students who came from difficult backgrounds and had problems creating and sustaining relationships were able to have positive experiences in a natural setting outside the classroom. Teachers were impressed that some individuals who did not usually work well in groups were more open to collaboration during the excursions and class work because they were so engaged with the ocean and the photographs**.** Experience with outdoor education in schools has shown that behavior improves when students are able to interact with their peers in a new environment and thus see them from new perspectives (Smith 2008; Smith, Steel et al. 2010). In addition self-esteem and self-confidence improve (Kellert 2002).

Teachers also noticed that the newer snorkelers were generally more enthusiastic about exploring the marine environment. Interestingly, teachers observed that this enthusiasm eventually spread to the more experienced snorkelers, who had approached the program with greater confidence but perhaps with less excitement. In exchange for the gift of enthusiasm, their confidence in the water then inspired the new snorkelers to be more assured and explore more widely.

Toward Learning

Teachers mentioned that, when they were at the beach, students had a more positive attitude about learning and that, compared to their classroom demeanor, their behavior changed for the better. Research has shown that improved attitudes are common among students when they are on outdoor excursions (Kellert 2002).

Attitude of Fun

Both adult and student participants responded overwhelmingly that they had fun during SUYO!. For most a sense of play was present throughout the program. Observing the participants, I could see that they were enjoying themselves and relating to the ocean as a place of interest and discovery. This positive attitude was the strongest of all evidenced by participants.

The teachers agreed that creating a fun-filled atmosphere is very important for programs such as SUYO!, especially with high-school aged and younger students. Indeed, the teachers in general believe that having fun is the main motivating factor for learning. The playfulness aspect of SUYO! is the reason that it is so engaging for youth.

While an attitude of fun is not per se discussed in prior photoelicitation studies, hints exist that the process was highly engaging for participants (Loeffler 2004; Loeffler 2004; Beilin 2005; Moore, Croxford et al. 2008). For example, one participant from Carlsson's 2001 study wrote that she had an "enjoyable" time when she was taking photos of nature (Carlsson 2001). Perhaps participants in SUYO! talked more about the fun that they had because the program is a group project. As I remember from high school, my peers and I had fun anytime that we had an excursion outside the classroom, almost regardless of the activity.

Negative Changes

Toward the Ocean (Qualitative)

Negative attitudes—for example, fear of the power of the ocean or of the dangerous animals living there--were also evinced during the interviews and group discussions. However, because these attitudes have a strong emotional base, they are included with the negative emotions discussed in the sense of connection section.

Toward the Ocean (Quantitative)

Although the quantitative data demonstrate that students in general entered the program with fairly positive attitudes about the ocean, the post-SUYO! data show a statistically significant change toward the negative. This movement toward less environmentally friendly attitudes can be gleaned from four answers in the student pre- and post-questionnaires. Although I could find nothing in previous literature or my research to explain this unexpected result, I believe that I can revise SUYO! to preclude this outcome recurring. Suggestions for revisions, some of which can be found in previous studies, will be discussed in a subsequent section, Modifications to Encourage Pro-Environmental Attitudes and Behavior.

However, at this point it is interesting to note research done by Sharon Connell, et al. (Connell, Fien et al. 1999). Connell et al. studied the attitudes of Australian high school students and found that if environmental issues do not affect the students directly, they do not think about them. She discovered that although students have a general concern about how humans are damaging the environment, they tend to be cynical and believe that their actions cannot make a difference. On the one hand, they are frustrated about environmental conditions, but on the other, they are not likely to take responsibility for their own impacts. They believe that everyone else should become more aware and change her/his attitudes (Connell, Fien et al. 1999). These findings suggest that overall students do not feel empowered.

Summary

One reason for studying and fostering attitude formation and change is that attitudes formed from direct experience can be strong indicators of future behavior (Glasman 2006). According to the qualitative data, mostly positive attitudes about the marine environment were fostered in participants. This outcome is a good indication that the program is useful at creating a general pro-environment attitude change. In addition, with the exception of South Fremantle SHS's encounter with the swarm of jellyfish, most of the experiences that participants had were positive. Participants, who enjoyed themselves and engaged well with the ocean environment, were also able to develop more positive attitudes toward one another.

In contrast, the quantitative data unexpectedly demonstrate a shift toward the negative. Results from a similar marine education study by Carl Stepath found that a program comprising direct snorkeling experience on the Great Barrier Reef but, like SUYO!, lacking a classroom knowledge-based component, led to shifts toward pro-environmental attitudes (Stepath 2006). This finding, which had been an expected result of SUYO!, was surprisingly not validated in quantitative data.

Standing alone, the student qualitative data indicate the development of a stronger sense of connection to the marine environment and a desire for more interaction. However, with the addition of the quantitative data, a different picture emerges. Students were less likely to believe that the ocean needs more care from humans or that they themselves need to change their behavior to be more environmentally conscious. Why some attitudes shifted to the negative is discussed subsequent to the intention to act section.

8.4- Sense of Connection to the Environment

This section describes the sense of connection to the marine environment that was fostered among the SUYO! participants. After their first-hand experiences in the ocean, participants generally felt more connected to it. Participants who had spent a great amount of time in the sea already had a strong connection, while participants who had spent little or no time in the sea were able to initiate their connection through their direct experiences and the photoelicitation process.

Kals et al. (1999) discuss the importance of prior nature experience in developing affective connections to nature. According to Kals, the more experience that participants had interacting with nature, the stronger their affective connection to nature was (Kals, Schumacher et al. 1999). Expanding this finding, Joe Hinds and Paul Sparks discuss their conclusion that people who have a stronger affective connection with nature are also more willing and eager to interact with it (Hinds and Sparks 2008). From this study, it appears as if affect affects behavior. They also found that people who grew up in more rural settings have a stronger sense of connection.

In his work David Abram discusses that direct sensual connection to nature is essential to re-establishing connection to the non-human world (Abram 1997; Abram

2011). Because humans grow up on the land, they experience the terrestrial environment by default. Because in comparison the sea is an unknown place, with unknown sensations and unknown organisms, SUYO! provided students with direct interaction with a "foreign" environment. When they encountered a whole new world during their first snorkeling excursion, participants who had little to no prior contact with the ocean felt as if a gap in their experience had been bridged. This theme was common throughout the data.

As does Carl Stepath within the context of marine education, Elspeth Probyn talks about this phenomenon in her discussion of "nature of proximity" (Probyn 2003; Stepath 2006). Derived from cultural geography, this term deals with the question of how people and things relate to each other based on various types of proximity. In writing about this concept, Stepath also refers to Gillian Rose, mentioning her use of the "space of relation," which he defines as "an imaginably conceived space between differing bodies" (Rose 1999; Stepath 2006).

Because many of them had never interacted in the ocean before, the "whole new world" experience was felt more intensely by students. Prior studies have shown that having more experiences in and on the ocean can foster a sense of connection in people. For example, students showed an increased sense of connection to the ocean when they went snorkeling on the Great Barrier Reef (cite Stepath 2006). When learning about the reef in the classroom, they had felt disconnected from it. After they had experienced it first hand, however, they felt more connected and more familiar with coral reefs (Stepath 2006). Students felt a sense of disconnection from the reef while learning it about it in the classroom from textbooks. However, when they interacted with the reef environment first hand, they immediately felt more connected to what they were learning. (Stepath 2006). If experiential techniques such as underwater photoelicitation can bridge the gap between the land and the sea and give students first-hand physical immersion in the ocean world, participants may be more likely to feel more connected to the marine environment (Stepath 2006).

According to the ecopsychological and related literature, adults and young people will not feel a strong desire to protect nature if it has not become a part of their identity (Kals, Schumacher et al. 1999; Hinds and Sparks 2008). While other sources argue for incentive systems to help foster positive environmental behavior

(Stern 1999; Gardner and Stern 2002), I chose to focus on fostering a sense of connection to help encourage pro-environmental behavior.

The concept of ecologic identification links to the deep ecology/ecopsychology concepts of ecologic-self and ecological unconscious (Bragg 1996; Davis 1998). Tools that develop the awareness of an ecologic-self and that foster the re-discovery of the ecological unconscious should be integrated into environmental education. Their main goals should be to instill the ability both to recognize that we are ecologically and energetically interconnected with the rest of nature and to realize that the health of the planet is directly linked to our physical and psychological health should be main goals of environmental education (Riley-Taylor 2002). How to help foster these goals is discussed in the following section.

Emotional Reactions

To achieve an awakening of the ecologic self/unconscious (Bragg 1996; Kals, Schumacher et al. 1999), a person must first form the emotional bonds to the non-human world that, when combined with information about ecology, can lead to a sense of connection to the biosphere. One of the primary aims of SUYO! is to develop this connectedness to the ocean.

Many of the positive emotions that I witnessed in participants during this research are biophilic—that is, they arise when people feel a strong affinity toward other forms of life and the rest of the natural world (Wilson 1984; Ulrich 1993; Hartig, Van den Berg et al. 2010). In contrast, all the negative emotions that I saw displayed are biophobic—that is, they arise from an innate or learned fear of the natural world (Ulrich 1993).

To Direct Experience

SUYO! participants had both positive and negative emotional reactions to their direct experience in the marine environment.

Positive Emotions

I believe that it is extremely important that people have enjoyable experiences in nature, for having positive, fun exposures to the natural environment can best foster that positive affective connection that deep ecologists, ecopsychologists, and conservation psychologists discuss (Kals, Schumacher et al. 1999; Clayton and Myers 2009; Muller, Kals et al. 2009). The positive emotional connections that SUYO! participants had are described in this section.

The increasing amount of time that contemporary youth spend inside is detrimental to the entirety of the biotic world, for it makes it difficult for these young people to form the sense of connection that is necessary to create a sustainable society (Louv 2008). If they are to acquire positive emotional bonds with and a sense of connection to nature (Louv 2008), children must play in and interact with the non-human world. SUYO!'s goal is to foster this kind relationship.

Student participants generally had a positive experience with their direct interactions in the marine environment. They felt more comfortable than they had previously with swimming in the ocean and acknowledged a deeper emotional bond to the marine environment. In addition after their explorations and subsequent increase in awareness, students felt more excited about their interactions with the marine environment. Their excitement stemmed from looking at new animals and exploring new places in the ocean while snorkeling, which was a novel experience for many. Also teachers sensed positive emotions in their students who were at the beach and working together in teams. For example, one student, whom the teachers identified as usually quite negative, averred that he had "uplifting experiences."

Carl Stepath's 2006 foundational Ph.D. thesis, Coral reefs as sites for experiential environmental education: Learning with Australian students, appears to have the closest parallels to my research within the field of marine education. While not explicitly focusing on affect during his interviews, Stepath does report that students in his study felt more connected after direct experience in the ocean and that most of them enjoyed their excursions to the Great Barrier Reef: They had fun. Participants in SUYO! also described that they felt more connected to the marine environment after completing the program. However, unlike with Stepath, the

present research encompasses specific questions that were asked of participants regarding their sense of connection. Their responses were integrated into the results. While Stepath touched only briefly on sense of connection, it is a central theme of this thesis.

Sandra Scott studied children's experiences with a field-based environmental education program, which was run at a marine science center and included direct experience with marine animals and their habitats. She found that the program increased both student awareness of and a sense of connection to the environment (Scott 2007). While Scott's study was based at a marine science center and SUYO! incorporated direct interaction with the marine environment, her findings support the idea that experiences with the non-human world lead to positive emotional reactions and a sense of connection.

Ecopsychological research has also focused on assessing the impact on emotions of direct experience of nature. Rader (2009) found that participants had an improved mood after time spent outside in a park setting (Rader 2009). Hinds (2011) found that participants on a wilderness excursion shared feelings of aliveness, contemplativeness, self-discovery, confidence, and wellbeing (Hinds 2011). These studies establish that nature experiences engender overwhelmingly positive emotional responses, and SUYO! backs up these findings. In SUYO!, unless there was something that hurt participants, made them scared, or was frustrating or challenging, the emotions elicited were positive.

Adults, like youth, were found to have become more sensitive and aware of the natural environment after spending time in it (Kaplan and Talbolt 1983). A study examining the restorative effects of time spent in the wilderness found that people experienced many more restorative effects when they were outdoors than when they were going about their daily lives and spending a limited amount of time outdoors (Hartig, Mang et al. 1991).,

The mostly positive emotions that SUYO!'s adult participants experienced while in direct contact with the marine environment were reflected through their well-developed spiritual connections to the ocean. Their interactions with the ocean during the program encouraged them to express the joy, excitement, peace, and wonder that they felt. Some adults reported that they were humbled by and grateful to the ocean when they were taking photos. In general, the adults had interacted more frequently with the ocean than had the students, and they did not display as

much fear of the marine environment. Although adults were very aware of the risks that they could face, they nevertheless chose to swim and surf regularly. The spiritual connections that SUYO! participants shared with the ocean are discussed later in this section.

Many of the adult participants came to SUYO! having already developed strong emotional connections to the ocean, and they mentioned in particular the restorative emotions that they felt while interacting in it. In fact, many adults chose of make the ocean a part of their daily lives because of the positive emotions it elicits from them. SUYO! provided a way for them to express their positive feelings toward the ocean and describe how they believe that the ocean helps them.

Some of the participants in SUYO! were living in urban environments, while others had a more rural lifestyle. Most of the students were urban, and most of the adults were rural. (This division did not exist with the pilot study, but those data were not included in the analysis). Did this difference affect their sense of connection? Joe Hinds and Paul Sparks found that participants who grew up in rural areas had stronger positive affective connections to, identification with, behavioral intentions toward, and attitudes about the non-human world (Hinds and Sparks 2008). While I did not ask adult SUYO! participants where they grew up, I do know that at the time of the program, the adults all lived in a more rural environment. Their connections to the non-human world appear to be stronger than do those of the students, most of whom lived in an urban environment. These stronger connections probably result from the combination of the adults' more developed attitudes and beliefs and their choice to live in less populated places—a choice that may have been made because of a person's pre-existing affinity for nature (Dunsborough, WA).

Negative Emotions

A common source of disconnection between humans and the marine environment is the way in which the popular culture portrays the ocean. For example, many people fear being overwhelmed by huge waves in the powerful seas, and many believe that the waters teem with potentially dangerous animals. In particular because of the way in which they are often presented in the media, sharks are an object of fear throughout society (Myers 2001; Philpott 2002). These and

other factors, such as stories about shipwrecks and lost vessels, influence people's attitudes about the ocean and their interactions in the marine environment.

Negative emotions were expressed during both the excursions and the group sharing of photos. To some participants, the ocean represented a foreign environment with many potential hazards. Immersion caused them to be fearful, especially on an overcast or stormy day. However, the strongest negative emotions were elicited from South Fremantle High School students after they swam with a swarm of jellyfish, toward which students subsequently expressed anger and hatred. Even though these were negative emotional reactions, students gained a sense of connection from interacting with the ocean and reliving to their experiences through photos. It would be interesting to ascertain if even negative emotions experienced in the ocean lead students to any change in their future interactions in the marine environment.

The recognition of human vulnerability appeared to elicit negative emotions from the participants, especially the youth. The jellyfish experience, for example, demonstrated to students that humans cannot always dominate other species, and that they in fact could be vulnerable in a foreign environment. The difficulty in accepting that humans can be endangered when we are in the natural environment speaks to the dualism that exists between many humans and the non-human world. This dualism is a concept that ecopsychological scholars discuss.

In her widely distributed story entitled Being Prey, Val Plumwood discusses her near death encounter with a crocodile in Kakadu National Park (Plumwood 1996). Val was attacked by a crocodile and barely survived with her life. This lesson in how vulnerable humans can be to other species taught her that we are completely linked to the ecosystem around us.

> This concept of human identity positions humans outside and above the food chain, not as part of the feast in a chain of reciprocity but as external manipulators and masters of it: Animals can be our food, but we can never be their food. The outrage we experience at the idea of a human being eaten is certainly not what we experience at the idea of animals as food. The idea of human prey threatens the dualistic vision of human mastery in which we humans manipulate nature from outside, as predators but never prey. We may daily consume other animals by the billions, but we ourselves cannot be food for worms and certainly not meat for crocodiles. This is one reason

> why we now treat so inhumanely the animals we make our food, for we can not imagine ourselves similarly positioned as food. We act as if we live in a separate realm of culture in which we are never food, while other animals inhabit a different world of nature in which they are no more than food, and their lives can be utterly distorted in the service of this end. (Plumwood 1996)

I believe that any intense encounters in nature, whether with, for example, crocodiles or jellyfish, remind us of the truth that no disconnection exits between humans and the non-human world. These experiences should teach us that our humanness does not set us apart from the rest of nature. Teenagers, who generally feel invincible, may have an especially hard time processing this reality. Anyone who feels angry or revengeful after such an encounter should attempt to channel that negative emotion into something constructive and reflect on the fact that it probably stems from sensing her or his vulnerability.

In future programs, this interaction could be a good opportunity for students to learn about the life cycle of jellyfish, where their habitat is, and how they can avoid getting stung. This painful and strong experience opens up the possibility of learning more about these creatures and potentially developing an understanding and respect.

To Photographs

Although both adults and student participants in SUYO! had a range of emotional reactions when viewing the photographs of their marine excursions, it was common for one photo to elicit either predominantly positive or predominantly negative emotions from the group.

Images of nature can elicit a variety of strong emotional reactions depending on the subject and the presentation. In his detailed report entitled The Psychology of Photographic Imagery in Communicating Conservation, Gene Meyers dedicates a chapter to examining how the use of nature-based images can elicit emotion. He acknowledges that "nature imagery may derive its emotional import from what it means for the person's relations with other people as much as from the natural object itself" and calls for caution when a researcher use images that induce negative emotion. Meyers suggests that images that result in positive emotions be used to

further conservation campaigns and that the use of negative imagery be limited because of its tendency to cause guilt, shock, and feelings of self-preservation. He found that these emotions discourage rather than encourage positive changes in behavior (Myers 2006).

In general there is a dearth of literature addressing how people react emotionally to direct experiences in nature, and most photoelicitation studies focus on social relationships, not on the relationship between humans and the non-human world. Apparently the current study is the first to use photoelicitation to elicit emotional responses from direct experiences in the marine environment.

Positive Responses

The positive responses that participants had to some photographs elicited the biophilic emotions that can foster a sense of connection to the non-human world (Kals, Schumacher et al. 1999). Participants reported that photographs of beautiful landscapes caused them to have feelings of peace and humbleness. Images of the ocean that were aesthetically pleasing had a calming affect. Images that were more abstract elicited creative and imaginative responses. For example, in a picture of the reef structure covered with seaweed, the group imagined that they saw rabbits, dragons, and other creatures. There appeared to be a strong relationship between photographs that were very light, colorful, and still and the evoking of positive emotions.

As reported in the few studies that focus on photography as a technique to foster engagement with the non-human world, participants often describe feeling connected, peaceful, and spiritual when they examine their images and talk about their experiences (Loeffler 2004). T.A. Loeffler found that photographs of the natural world remind people of the feelings of peace that they felt in nature. As discussed above, this phenomenon was seen in the current study: Participants were reminded of feeling peaceful in the ocean.

Interestingly, it has also been shown in these studies that for participants to feel the calming effects of nature, photos did not have to be linked to a direct experience. Feelings of peace were elicited merely from viewing element-based images—for example, water or sky. Thus nature-based photographs can induce

strong positive emotions even from people who were not present when the photos were taken. Many participants in the current study did in fact describe feeling peaceful simply by looking at photos that other participants had taken. Perhaps the viewing of these images reminded them of previous positive experiences that they had had in nature.

As it has been in the data from other outdoor programs, establishing connection with other people is also a common theme in the current data. (Loeffler 2004; Smith 2008; Smith, Gidlow et al. 2012). Participants connected with each other during their direct experiences in the ocean, and they relived these connections when they shared their photos.

Photos of people interacting while they were snorkeling elicited humorous responses and feelings of happiness during the group discussions. The photographs that showed friends having fun together allowed participants to laugh with each other and happily relive their experiences.

Self-portraits were quite emotive, eliciting positive responses from both the photographer and the other group members. For example, people laughed at the "bubble moustache" photo, and when the photo of one participant making a funny face appeared on the big screen, the group erupted in a fit of giggles. Photographs of animal behavior, such as the mating sea slugs, could also elicit laughter from participants.

Negative Responses

Some photos elicited negative emotions among group members that at times were not shared by the photographer. In revealing that fear was the most common negative emotion, the data from the current research comport with findings in the literature analyzing other outdoor experiences. (Pergams and Zaradic 2008; Von Benzon 2011). Researchers have hypothesized that this biophobic response has an evolutionary basis: Human survival depends on a healthy amount of fear of predators and other threats. (Ulrich ; Hartig, Van den Berg et al. 2010).

Images that represented the raw power of the ocean elicited feelings not only of fear but also of respect. Dark photos that depicted a lot of water movement resulted in people feeling as if they were trapped or drowning. Photographs of the

jellyfish that stung one of the classes elicited strong feelings of anger and hatred. Photoelicitation is effective at drawing out people's fears of the ocean, but in doing so, it allows for further discussion of these fears.

Responses to Color and Movement

Because of the quality of the cameras, many of the photos were blurry. Photos that lacked a clear subject but contained a lot of movement or color elicited especially strong emotional responses. With the subjects unclear, participants "felt" the artistic elements more and were often able to describe a more pronounced emotional reaction to the abstract images. Thus pure color and shape could elicit a stronger emotional response than could a clear subject. As with the sharper photos**,** photographs that were predominantly dark, had fewer colors, and appeared to be in motion (usually blurry images) generally evoked negative emotions from the group. Photos that were lighter, more colorful, and clearer elicited more positive emotions.

Images do not have to be of specific subjects to elicit emotional reactions from participants. Naz Kaya attempted to study the affective responses that college aged students had to viewing a wide range of colors. As with the present study, participants who viewed the colors green and blue, experienced positive affective responses. Both colors reminded them of nature, and blue specifically reminded participants of the ocean, beach, water, and sky. Viewing the color blue had a calming and relaxing effect on participants (Kaya and Epps 2004). This finding correlates with participants' emotions about the ocean in general and the viewing of photographs of the ocean. Many of the blue and green images captured during SUYO! were associated with positive emotions. These affective responses perhaps link into a deeper sense of connection to the ocean. Darker colors such as black and grey elicited mostly negative responses from SUYO! participants. This result also correlates with previous findings in the research (Kaya and Epps 2004).

Spiritual Feelings

Photoelicitation has previously been shown to be very effective at bringing out and representing participants' spiritual feelings about the non-human world (Loeffler 2004; Beilin 2005; Bignante 2010). This effectiveness extends to the photoelicitation process used in the current study.

Many of the adult participants came to the research with well-developed spiritual feelings about the ocean and an understanding of how their lives relate to the marine environment. In general, because they lived by the sea, the adults had significant emotional, spiritual, and physical ties to the ocean. They also believed in the importance of stewardship. The strong bonds to the ocean that most had formed emerged frequently throughout the data-collection process. Among the possible reasons that the adult participants were already so connected to the sea are the following. First, the volunteer base was from a small coastal community that is known for its beaches. Second, a high percentage of the local community is frequent ocean-users in the form of surfing, swimming, diving and fishing. Similar belief systems are described in other studies of surfing communities (Taylor 2007; Kerby 2010).

Although I realize that selecting participants from a coastal community may have skewed results of the study, I made the choice deliberately. The intention was to test whether underwater photoelicitation is a practical methodology and if it fosters positive affective connections with and attitude changes about the ocean. Testing this methodology within a coastal community was easier for a number of reasons.

First, it was likely that there would be sufficient volunteers from a community with close ties to the ocean. Second, the ocean was very accessible for many participants, and they were competent snorkelers. A study such as this undertaken with inland community members would have been much more logistically challenging and not as sound ethically because participants might have been less used to being in the water and therefore perhaps not competent swimmers and snorkelers.

Adults were able to express their beliefs, and some participants were even able to develop them further through the photoelicitation process. A number of

participants described feeling more respect for and a greater sense of stewardship toward the ocean after participation. Most adults described the ocean as a place where they could feel free and escape from the human dominated world. Participants enjoyed being able to represent their feelings toward and beliefs about the ocean during the interviews and group work. Sharing their views gave them a chance to see that many of the other participants held similar beliefs about the ocean.

A few recent studies have described the spiritual connection that surfers can have with the ocean (Taylor 2007; Kerby 2010). Like the present one, these studies show that most surfers acquire a sense of peace and rejuvenation when they interact with the ocean. Prior studies have also shown that direct experiences in outdoor environments often elicit feelings of spirituality. In T.A. Loeffler's 2004 study, spiritual connections to the outdoors commonly arose in participants who analyzed photos of wilderness experiences (Loeffler 2004). Other studies of nature-based experiences describe participants' spiritual emotions and beliefs (Stringer and McAvoy 1992).

Many SUYO! students mentioned that they feel as if they have a positive connection to the ocean and that the ocean is something special and uncontrollable. Some stated that the ocean gives them a sense of peace and freedom when they were interacting in it. After participating in the program, a few students noted that they believed that they had developed a stronger connection to the ocean and its animals. For many students the ocean is a place to play, relax, and have fun even though some mentioned that they have to be cautious about some aspects of the marine environment. It is critical for developing positive affective connections that youth be allowed to interact with and have fun in nature SUYO! provided this opportunity (Louv 2008).

On the one hand, the literature contains only a few studies that assess children's sense of connection from an ecopsychological/deep ecology perspective. On the other, many articles focus on children's environmental values, which are similar to a sense of connection (Cobb 1977; Chawla 1986; Kaplan and Kaplan 1989; Kahn Jr and McCoy 1992; Kahn and Friedman 1995; Kahn Jr 1997; Kellert 2002). Although it is not discussed in ecopsychological terms, these articles contain good indirect indicators of children's level of connection to the environment. A common theme throughout this literature is that children who are exposed to nature at an early age develop a stronger sense of connection/values than those who are not.

Kaplan and Kaplan also discuss the fact that the positive effects of nature are strongest in middle childhood (ages 6-12) (Kaplan and Kaplan 1989). Although participants in SUYO! were older, hopefully they were young enough that they were still developing their environmental values. Ideally programs such as SUYO! would work with younger groups whose environmental values definitely are in the formative stages.

SUYO! As a Potential Significant Life Experience

One of the goals of SUYO! is to foster environmental sensitivity by offering participants the possibility of undergoing significant life experiences (SLE), the formative memories or learning occasions that provide the basis for people's values regarding and attitudes about the non-human world (Tanner 1980; Chawla 1998). SUYO! was designed to generate the opportunity for SLEs, both by introducing participants to a new way in which to experience the marine environment and by creating a new way for them to develop memories of their experiences. For example, it was not uncommon for students to write that they learned of the existence of "a whole new world" underwater and for both students and adults to have vivid memories of their experiences during their ocean excursions. After being part of SUYO!, participants felt more connected to the ocean and had more positive attitudes about interaction with that environment.

Hopefully, this kind of increase in awareness can foster SLEs for some students and thus curtail the shift in attitudes toward the negative. Although clearly not all students will have these kinds of experiences with SUYO!, the program does offer the opportunity for positive SLEs to be generated.

Participants in SUYO! did become more environmentally sensitive, one of Hungerford's and Volk's entry-level variables for responsible environmental behavior (Hungerford and Volk 1990). For purpose of this research, I use Chawla's definition of environmental sensitivity as "a predisposition to take an interest in learning about the environment, feeling concern for it and acting to conserve it, on the basis of formative experiences" (Chawla 1998, p. 19). Underwater photoelicitation directly addresses the issue of environmental sensitivity via first-

hand experiences in nature and the sharing of these experiences through photography.

An empathetic perspective is a component of environmental sensitivity, and fostering this perspective is an important part of environmental education (Chawla 1998). Although the term has multiple definitions within the literature, in the context of this research, it means having the ability to share the perceived emotions of another being (Eisenberg and Strayer 1987). Ecopsychologists and deep ecologists call for developing empathetic awareness of entire ecosystems and of Gaia, the life force of the planet (Taylor 2001). During SUYO!, the term *Gaia* was not used because it has the potential to turn some students off participation or engagement. These students are likely in the most need of developing a sense of connection to the non-human world and programs should therefore be designed to make the language as accessible to them as possible.

Giving students an experience in the ocean that allows them to develop a sense of connection can help foster an empathetic perspective. The literature discusses the fact that young children, who tend to see the world in more animistic terms, intrinsically have a more empathetic perspective (Chawla 1998). These bonds appear to dissolve as children become older and more disconnected from the non-human world (Louv 2008). One goal of future SUYO! programs will be to reach younger aged children who have not lost that animistic relationship. Although older children and adults can rediscover this relationship, it would be easier and more effective for environmental education to build on the connection before it is lost.

Summary

The qualitative data resulting from the current study demonstrate that underwater photoelicitation, applied both individually and during group workshops, is successful at eliciting emotional reactions from participants. In addition it is clear that emotional reactions resulting from the underwater experience can be relived through photography (Harper 2002). Moreover, sharing photos as a group expands participants' understanding that people can react quite differently to photographs. Overall, both adults and students had positive experiences, and after these experiences they felt a stronger connection to the ocean. Even when the responses

were negative, participants were engaging with and becoming more aware of the non-human world.

A sense of connection to the ocean appears stronger in SUYO! adults, probably because of the amount and quality of time that they spent interacting with the marine environment. In addition the adult population was from an ocean-oriented community, where they chose to live mainly because of its proximity to the water. In general the students who seem to have the strongest connection were from the Busselton SHS marine studies program. Their strong beliefs about the ocean are similar to those expressed by the adult participants. This similarity is most likely due to the fact that these students lived very close to the sea and that many of them interacted frequently with the marine environment. Student beliefs could also have been influenced by their parents. Their parents might have chosen to live in Busselton because they value the seaside lifestyle, and passed these values onto their children.

After their SUYO! activities both adults and students felt more connected to the marine environment and had a broader way of viewing and engaging with the ocean. Participants increased their understanding of and appreciation for how the ocean is, what kinds of life it harbors, and how they and others feel about the marine environment. Since most adult SUYO! participants entered the program with a strong sense of connection to and positive attitudes about the marine environment; these feelings were probably reinforced by the opportunity to share them with a group of like-minded people. Teachers thought that their students had gained a better appreciation of the marine environment.

The present research demonstrates a new methodology to help people develop a sense of connection to the non-human world. No other techniques in the literature use digital technology and direct experience in nature to foster a sense of connection. Therefore, this study appears to add a new technique to the ecopsychological/deep ecology goals of establishing a sense of connection to the non-human world.

8.5- Intention To Act

> Imagery alone is likely to be evocative but not directive. In other words, an emotionally potent image arouses emotion but it does not communicate what to do. Both aspects actually depend on the viewer's beliefs, interpretations, and existing values. So if the image arouses feelings that affirm values, the person will feel positive emotions, but if it threatens their values, the emotions will be negative. What the viewer does in response to the image will depend on the viewer's secondary appraisals, which will take into account his or her context and other priorities. The point is again that images alone communicate a full message only depending on the viewer's completion of the message-- an uncertain outcome. (Myers 2006, p. 28)

Prior to SUYO!, I hypothesized that an auto-driven photoelicitation program focused on direct experience in the non-human world could be effective at fostering pro-environmental behavior. Because of the experiential nature of this process, underwater photoelicitation could in theory be more successful at fostering behavioral change than non-experiential photography-based programs had proven to be. Direct contact with nature could create the sensitivity necessary to positive action. Since I found nothing in the literature specifically stating that direct experience alone would not achieve this goal, I thought that was a strong basis existed for this hypothesis.

Prior image-based research that focused on environmental behavior change, but did not include direct experiences in nature, shows that to create a positive change, photo-based programs must actively teach stewardship behaviors (Myers 2006; Jones and Baldwin 2009). Only with this inclusion of a knowledge component should one expect an increased intention to act with more pro-environmental behavior (Rowe 2002).

In his comprehensive review, *The Psychology of Photographic Imagery to Communicate Conservation,* Gene Meyers writes that use of imagery alone in an educational program is not enough to create genuine behavior change. "*Imagery with emotional import is processed very rapidly, and is likely to be evocative but not directive-- so other inputs are necessary if the viewer is to be guided toward a*

specific action" (Myers 2006, p. 20) Although imagery can elicit emotional responses and make an idea more concrete, to be successful, a program must contain other elements, such as an appeal to the viewers' values, an explanation of the specific environmental threat, and a description of the ways in which people can help (Myers 2006).

A photovoice study with residents of the Mary River establishes the validity of Myers' prescription. In 2009, the lifestyles of these residents were in jeopardy from a proposed dam. Save the Mary River, an organization opposed to the dam construction, asked some residents to take photos of aspects of their community and its natural surroundings that they believed would be affected by the dam. These photos were then shown to other residents with and without captions or contextual comments. The researchers found that the latter images were unlikely to provoke pro-environmental feelings or generate calls to action. In contrast, images that both contained a clearly stated message and placed the pictures in context were more likely to stir these attitudes and intentions to act (Jones and Baldwin 2009).

Although SUYO! took these studies into account, I wanted to ascertain if unaltered images combined with direct experience in the ocean could foster positive behavior change toward the sea. While Jones and Baldwin (2009) discuss how participant-taken photography may affect environmental behavior change, there appeared to be ample room for further research into that question, for it had not been comprehensively addressed in the literature. Therefore, with previous studies in mind, SUYO! was run without including specific information on how to change environmental behaviors.

According to the qualitative data, although some participants did state that they would adopt more pro-environmental behavior, they were vague about their intended actions. Many averred they would interact with the ocean more frequently and that they had been motivated to do more photography. In contrast, according to the student quantitative data, overall intention to act pro-environmentally decreased after participation in SUYO! This result was surprising because even though no program component actively encouraged behavior change, one would not have expected a negative shift in intention to act. These results are discussed in more detail below.

Positive Intended Behavior Change

Subsequent to their participation in SUYO!, students were enthusiastic to return to the sea and excited to explore different marine environments. Most appeared to be much more willing to go into the ocean, and their teachers noticed a greater confidence about snorkeling. Studies of terrestrial-based marine programs also demonstrate this increased enthusiasm (Caterini 1982; Scott 2007)**.** Although the heightened enthusiasm discussed previously in the section on change in attitudes has been demonstrated in other studies, I and other researchers have not specifically asked whether the students would increase their interactions with the ocean after having participated in (Stepath 2006). However, based on the SUYO! data, underwater photoelicitation seems effective at motivating participants to directly experience and explore the ocean more.

Participants also expressed an increased desire to take more photography after completion of SUYO! Previous photoelicitation and photovoice studies also demonstrate that participants who enjoyed their photographic experience expressed a desire to take more photographs. For instance, Strack, et al. (2004) found that 91% of students agreed or strongly agreed that they enjoyed taking photos and that 83% agreed or strongly agreed that they wanted to take more photos (Strack, Magill et al. 2004). The results were similar for SUYO! participants; after involvement in the program, they were motivated to do more photography. People saw photography as more accessible, and they gained a better understanding that photography is both a skill and a means of artistic expression.

Some SUYO! participants also became interested in how they could take care of the marine environment and be more mindful of marine life while they were underwater. Previous studies of direct experience in the ocean have shown similar results. After students had snorkeled and completed a monitoring program on the Great Barrier Reef, Stepath (2006) asked if their ecological intention to act would change. Many students averred that they would interact with the reef differently, either by treating it with more respect (directly) or changing their land-based habits (not polluting) (Stepath 2006). However, as with the current study, there was no follow up to learn if the participants had actually implemented any of these changes.

David Ashurst studied the effectiveness of a high school marine science curriculum that was coupled with an experiential, field-based program (Ashurst 2008). He found that all students benefited from the experiential aspects of the program and that their knowledge about ecology grew and their opinions about human impacts became more informed.

A few of the SUYO! participants reacted to the human impacts that they witnessed—for example, trash on the beach and underwater—by expressing a feeling of stewardship. However, perhaps because the WA marine environment is quite healthy by global standards, stewardship is not a major theme in the data (Fletcher and Santoro (eds.) 2012). If SUYO! had taken place in a more impacted environment, perhaps the participants would have expressed a greater commitment to taking action. Moreover, it is important to note that the few responses that were elicited could be related more to a participant's existing attitudes and values rather than to her/his newly developed ones.

On two occasions adult participants related their direct experiences/photographs to recognition of the need to increase stewardship. One woman expressed a desire to learn more about responses to human impacts after she had evaluated her photos of construction on a jetty. Another adult participant thought about ameliorating human impacts when he reflected on a photo of his own footprint in the sand. His footprint became emblematic of how heavily humans have trod on the Earth.

One of the teachers was surprised to hear students discussing conservation of the sand dunes while they were at the beach. Another teacher overheard a conversation between two students about water pollution, with one student telling the other that they need to watch what they put down the drain because it could harm the ocean. Overall, although teachers thought that after SUYO! students had more respect for the ocean, they were unsure about whether they would change their behavior.

Prior studies acknowledge the importance of experiences in nature in fostering stewardship behavior (Finger 1994; Nisbet, Zelenski et al. 2009; Stepath and Bacon 2010). A general trend described in the literature is that the more time people spend in nature, especially during childhood, the more likely they are to develop stewardship behavior (Chawla 1998). There are a few examples of how photoelicitation can foster stewardship of the non-human world. Beilin (2005)

discusses how the use of auto-driven photoelicitation has helped farmers see the impacts on their land and has helped them think about how to better manage the changes (Beilin 2005). Bignante (2010) uses photoelicitation to empower a Maasai village to portray its use of natural resources (Bignante 2010).

SUYO! aimed at providing an experience that may could have fostered more positive attitudes toward stewardship. It was thought that direct experience in the marine environment coupled with the sharing of these images would result in increased stewardship. However, no knowledge was given as to how participants could take further steps in becoming better stewards. In retrospect, this knowledge should have been given. The lack of this knowledge is discussed in a following section.

Negative Intended Behavior Change

Although the qualitative data reveal almost all positive intentions to act, four intention-to-act questions from the student quantitative study divulge negative intentions to act. The remaining answers show no statistically significant changes between pre and post questions. These four questions are outlined in the quantitative results chapter (Ch. 7). Possible reasons for this negative change are discussed below.

Many students who participated in SUYO! wrote that after first-hand experience, they realized that the ocean is much bigger than they had thought. While this realization may have been positive and motivating for some, it may have led to a feeling of helplessness for others who came to believe that the ocean is overwhelmingly large and that they did not possess the ability to make a difference in protecting it. This perception of disempowerment may have led to the negative intentions to act. The SUYO! data thus support the claim by Hungerford and Volk that including information that addresses environmental action strategies is important for fostering responsible environmental behavior.

Apparently empowerment of youth is essential if they are to change their behavior toward the environment. Hungerford and Volk refer to the provision of this information as *empowerment variables* (Hungerford and Volk 1990). If students could learn to direct their desire to help the ocean toward environmental campaigns,

direct action, educational programs, etc., then they would perhaps feel more empowered.

Another explanation is that because the waters that they explored appeared to the participants as beautiful, clear, and healthy, they may have concluded (in the absence of information to the contrary) that there was no need to take any protective actions.

Summary

After SUYO! participants stated that they would not only interact more in the ocean but also engage more photography. In addition a few participants discussed having a stronger desire to be better stewards. However, most likely because of a lack of empowerment information in the program, a trend emerged in the data demonstrating a disinclination to change negative behaviors.

Although increasing awareness and engaging participants emotionally through direct experience and photography are important the results of this thesis show that information leading to empowerment is also necessary if we are to create a balanced program and foster pro-environmental attitudes and perhaps responsible environmental behavior. The next section discusses the need for and the way in which information can be integrated into a program such as SUYO!.

8.6- Modifications To Encourage Pro-Environmental Attitudes and Behavior

From the data, it is clear that SUYO! was not completely effective at fostering positive attitudes and pro-environmental intention to act. While successful in many regards, there were some disturbing trends in the quantitative data that indicated something was missing from the program.

With their model for responsible environmental behavior (REB), Hines, Hungerford and Tomera (1987) proposed that behavior can be changed through education that responds to established variables recognized as influencing the ways

in which people conduct themselves (Hines, Hungerford et al. 1987). Among these variables, which are identified as entry-level, ownership, and empowerment, is the acquisition of certain types of knowledge (Hungerford and Volk 1990) (See Figure 25)**.** One problem with SUYO! is that it lacked a knowledge component. As demonstrated in the quantitative data, SUYO!'s failure to encourage the growth in positive attitudes that bring about behavior change seems to be an outcome of that lack.

Although well represented in the literature, the REB model is not without its critics. The understanding of the relationship between attitudes and behavior is nebulous at best, and many different models exist to explain the complex relationship (Fietkau and Kessel 1981; Ajzen 1991; Blake 1999; Kollmuss and Agyeman 2002).

Integrating Knowledge-Based Components

This section addresses the need to include additional information in future programs in order to create a more comprehensive and effective learning process. Because adults were not assessed in this area as thoroughly as students were, any attempt to describe action/empowerment knowledge with relation to the adult SUYO! program would be purely speculative. Therefore, this discussion deals only with the student data.

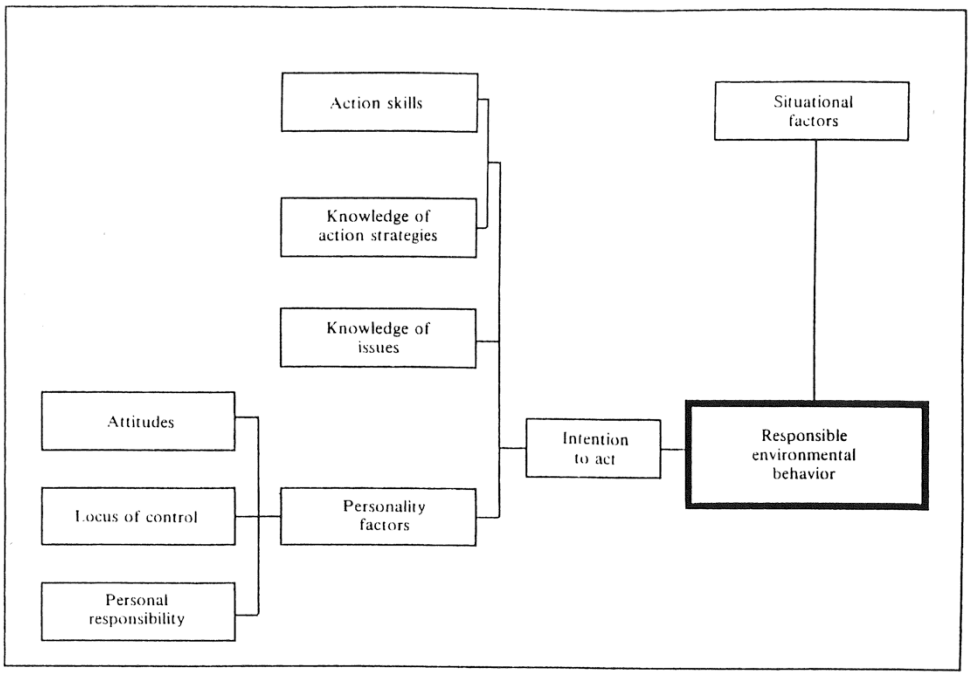


Figure 24- Model of Responsible Environmental Behavior (Hines 1987)

The model above shows the variables that influence responsible environmental behavior. Because SUYO! focused on fostering positive attitude change, it did not include variables such as action skills or knowledge components, which have been shown to be critical in fostering intention to act with pro-environmental behavior. The present research establishes that encouraging a sense of connection and positive attitudes alone is clearly not enough to spur responsible environmental behavior.

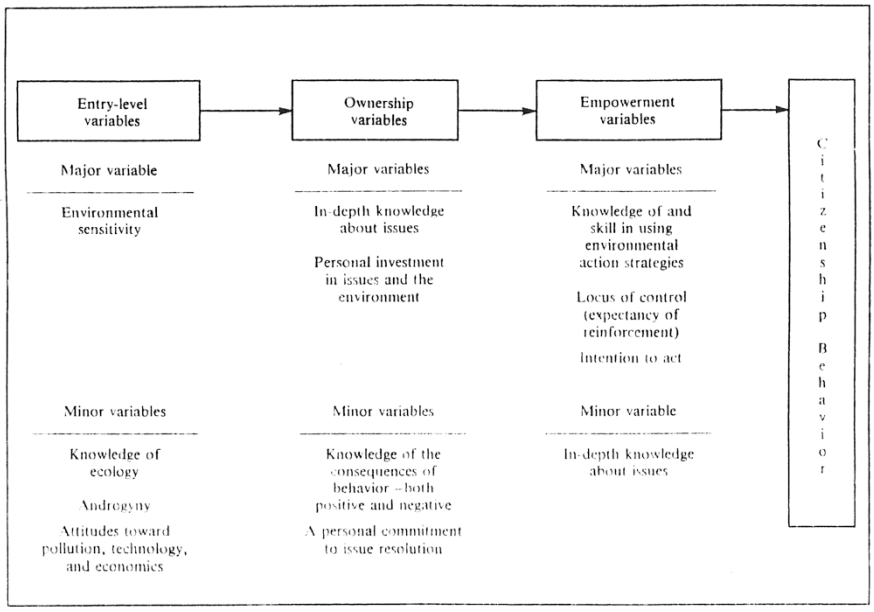


Figure 25- Variables that make up environmental behavior (Hungerford and Volk 1990)

The table above shows the variables that make up environmental or citizenship behavior, as discussed previously in Chapter 3. The three variables are entry-level, ownership, and empowerment. SUYO! was able to address and include entry-level variables and to partially address ownership variables. However, it did not address empowerment variables. According to the Hungerford and Volk model (Hungerford and Volk 1990), the program was therefore lacking certain components,. The three types of information specific to SUYO! that should have been included were information about marine ecology, about human impacts, and about individual empowerment to behave in ways that are positive for the environment.

About Marine Ecology

In examining the results of the quantitative study, I realized the need to include a knowledge-based component in SUYO! that presents information on the ecology of the marine environments being explored and photographed. Without this component, most participants did not understand the ecologic significance of the phenomena that they were witnessing and capturing photographically.

The students were not taught that sustaining life on Earth depends on the health of the oceans. While SUYO! students may have become more aware that these marine ecosystems exist, they did not learn anything about the life processes of the species living there or about their relationships to other organisms.

Prior research in high schools has found that students' marine ecologic knowledge is lacking (Cummins and Snively 2000; Ashurst 2008), and a similar lack has been found in adults (Steel, Smith et al. 2005). According to Hungerford and Volk, ecologic knowledge is a crucial entry-level variable in the model for environmentally responsible behavior (REB) (Hungerford and Volk 1990). Entry-level variables include environmental sensitivity, which SUYO! addressed, information about ecology, which SUYO! did not focus on, and attitudes about pollution/technology/economics, which SUYO! indirectly addressed through specific questions to participants. However, the program did not focus on purveying information that may have changed attitudes.

A possible way to move participants toward positive environmental behavior changes is by helping them to gain both awareness of the environment through direct experience (experience-based) of it *and* knowledge about the environment through information (knowledge-based) on marine ecosystems. Future SUYO! programs should include local relevant information about the marine environment that is being explored; and, when the photos are being analyzed, their significance should be explained in ecologic terms. In addition general information about marine environments should be discussed.

About Human Impacts

Another major gap in SUYO! was its lack of information about human impacts on the oceans. Because students did not learn about the consequences of their actions, they did not realize that their actions could be harming the ocean. This lack of knowledge was reflected in their responses. Students snorkeled in apparently healthy environments, and they perhaps therefore concluded incorrectly that marine environmental problems do not exist. They were obviously unaware of relevant scientific evidence to the contrary.

If human impacts on the ocean, including their own, had been discussed and students had learned how greatly pollution affects the seas, they would probably

have supported increased pollution controls (Bradley 1999). However, because SUYO! did not convey this information, students were more likely to think that the ocean animals do not need their help, and they were less likely to think that humans need the ocean for survival. It appears that without information about the precarious state of the Earth's oceans and the consequences that human depredation will have on all life, most participants will have little incentive to become more environmentally responsible.

For future programs to be successful at fostering environmentally responsible behavior, information about negative human impacts must be included. In Hungerford and Volk's REB model (Hungerford and Volk 1990), this kind of knowledge is referred to as an ownership variable. Ownership variables not included in SUYO! are, for example, in-depth knowledge and personal investment in an issue/action. Fostering ownership is another component that SUYO! could emphasize by teaching such things as human dependency on the ocean and the effects that overfishing will have on our diets.

About Empowerment

Finally, SUYO! students were given no tools for responding to the environmental issues, such as disposal of trash, that they encountered on their underwater journeys. According to Hungerford and Volk, such information is an empowerment variable, which can give people a sense that they can make changes and help solve crucial environmental issues (Hungerford and Volk 1990). The categories within empowerment variables that SUYO! did not include are knowledge of and skill in using environmental action strategies and the potential that individuals have for effecting change. SUYO! did, however, include the category of intention to act.

SUYO! did not offer information about how participants could become empowered to act to help the ocean, and the effect of this lack can be seen in the student quantitative questionnaires. It may have led to a feeling of powerlessness and thus a sense of detachment that could have been influential in the negative shift in attitudes.

My results suggest that in order for participants to gain a sense of empowerment, they need information about, for example, how to get involved in marine campaigns, how to change their everyday habits (using less plastic, eating sustainable seafood), how to join beach cleanup days, or how to raise online awareness about marine issues through social media. If this kind of information is included in future programs, participants would perhaps develop more positive attitudes about their ability to effect change, and they might engage in some positive actions regarding the environment.

Summary

Even if information about all the variables of Hines et al./Hungerford and Volk's model of Responsible Environmental Behavior (REB)--entry-level, ownership, and empowerment--had been included in SUYO!, uncertainty would have existed about whether the program would foster responsible environmental behavior. The addition of information based upon the concept of ocean literacy and proper use of the REB behavior model might have fostered more pro-environmental attitudes and therefore more positive intended behavior change (Hines, Hungerford et al. 1987; Hungerford and Volk 1990; Plankis and Marrero 2010). However, as stated in Chapter 3- Research Methodology, previous studies vary in their conclusions regarding the effects of environmental knowledge and attitude effects intention to act.

Research subsequent to the 1990 Hungerford and Volk article supports their model by demonstrating that in order for environmental education programs to be effective, they must include the entry-level variable of information about ecology and the ownership variable of information about human impacts (Bogner 1998). If students become aware of the ocean through direct experience but do not know the ecologic significance of what they are experiencing, their awareness is only partial. If they do not learn about the impacts that humans are having on marine life, their lasting impressions might be only of the experiences that they had in the ocean on that day and the photos that they took. Although they might feel more connected to the sea, they will have little to no knowledge-based context in which to place their

impressions. Despite the fact that their experiences, observations, and memories engage the students in terms of bridging the space of relation, these factors do not appear to directly encourage pro-environmental attitudes (Rose 1999; Stepath 2006).

Further studies should be undertaken to see if inclusion of knowledge-based components within a program of experiential underwater photoelicitation would be more successful in achieving this goal. Armed with sufficient knowledge about marine ecology, about human impacts on the marine environment, and about how they could take positive action, the SUYO! students may not have experienced the negative attitude shifts that appear in the quantitative data.

8.7- Benefits of Bridging Disciplines

This study attempts to bridge the gap between two related disciplines, ecopsychology/deep ecology and conservation psychology. The former focuses on experiential connection and emotional engagement with the non-human world and often describes these connections qualitatively. The latter focuses on quantitatively understanding attitudes and how they influence intention to act with pro-environmental behavior. These fields also differ in the fact that ecopsychology/deep ecology is more spiritual while conservation psychology is a more practical, technical discipline.

Combining these disciplines contributes to a more holistic research methodology that appreciates and studies both the emotional and the intellectual aspects of learning. However, it also resulted in an unexpected outcome for the SUYO! program. I began with the hypothesis that direct experience and emotional engagement would be enough to shift attitudes. Although some attitudes about the ocean did shift positively, other environmental attitudes were either unaffected or shifted negatively. Relevant literature indicates that this latter shift was most likely caused by a lack of knowledge among participants that led to their feeling somewhat disempowered.

If the study had been only qualitative, almost all the data would have shown positive results for attitudes and intentions to act, and the matter of including knowledge-based components in SUYO! would not have been addressed. Thus the

addition of the quantitative methods (taken from conservation psychology research) led to a more thorough understanding of the underlying learning processes. In this way, the SUYO! research has taught me that mixed methods in research provide a fuller picture. Furthermore, I have learned that for environmental education to be effective, it should combine the imparting of knowledge with the provision of direct experience in nature.

In addition, because I used both qualitative and quantitative methodologies and asked participants not only about connection and spirituality but also about attitudes and behavior change, participants were encouraged to elaborate on more aspects of their experiences. Discussing all these elements allowed them to deepen their understanding of the ways in which they relate to the ocean.

Developing Ecologic Self/Unconscious

The development of an ecologic self and unconscious should be the ultimate goal of environmental education. Not everyone will identify with the non-human world in this way, but the more that people can be exposed to first-hand experiences in nature, the more likely they are to develop a sense of connection. For the most part, awareness of an ecologic self/unconscious comes mainly with direct experience; it usually does not originate in knowledge alone. However, knowledge is an important aspect of awareness (Kuhlemeier, Van Den Bergh et al. 1999); without it people may not understand the context for their first-hand experiences.

This research shows that information about issues and how to take empowered environmental actions has to be included alongside direct experience in the non-human world. SUYO! results cast doubt on the hypothesis appearing in some literature that behavior change will come naturally as a sense of connection strengthens (Bragg 1996). The program findings demonstrate that even if people feel more connected and sense fewer barriers between themselves and the non-human world, they require information in order to develop their ecologic self/unconscious. With proper modifications, programs such as SUYO! will be better able to foster such a development.

8.8- Future Programs

A few lessons learned from this research are listed below. Areas that could warrant future research are also discussed.

Lessons for Future Programs

Preparing Participants for Snorkeling in the Ocean

Because participants will always come to the program with varying degrees of snorkeling skills, I believe that having a preliminary instructional session in the pool is useful for everyone, from the complete novice to the experienced snorkeler. During these sessions participants can familiarize themselves with the gear and learn how to operate the cameras underwater. This pool time can also be spent in learning to work as buddy teams in the ocean.

Integration into Curriculum

Integrating programs such as SYUO! into school curriculums would allow for the students to spend more time processing and utilizing aspects of their experiences in nature. If programs such as these could be run over a period of a few months, and integrated into various aspects of the curriculum, then students would have more time for reflection on their experiences. Integrating these programs would be an important step in creating a curriculum whose outcomes are in line with sustainability and deep ecology.

Using Technology to Engage Participants and Foster Awareness

Although the majority of earlier photoelicitation studies apparently used film cameras for research (Strack, Magill et al. 2004; Beilin 2005; Epstein, Stevens et al. 2006), I believe that using digital cameras is important. Because they were born into a highly technological world, most students readily engage with technology. The

prevalence of electronic devices has produced a generation that has integrated digital culture into their everyday lives (Montgomery 2007). The phenomenon has also changed the classroom culture, making it more interactive, personal, and collaborative (Brockman 2010). My choice to use digital cameras was not merely a technological upgrade decision but also a pedagogical one. The SUYO! method of photoelicitation seemed to tap students' enthusiasm and creativity and to enrich their learning experiences by making their photos readily available for sharing and discussion.

SUYO! participants learned to use the digital cameras quite quickly and were frustrated only by the fact that, due to low screen quality, they were unable to review their pictures while snorkeling. In the future this problem can be solved by the purchase of more expensive cameras. Digital cameras not only are easier to use but also are cheaper to operate with no film or printing costs. In addition, and a capability that I will consider using in future programs, digital cameras can take movies.

Another benefit of digital images and video is that these high-resolution media can be transferred directly to a computer without loss of quality, and they can easily be shared through social media such as Facebook. In fact one SUYO! participant took the initiative to share his underwater video online. This sharing ability expands SUYO!'s reach and has the potential to inspire and motivate others to explore the ocean. At the very least looking at the photos will heighten awareness of the ocean world among family and friends. For future SUYO! programs, I will encourage participants to share their experiences on social media.

I believe that, in order to enhance environmental education, teachers should accept the ubiquity of social networking and begin to embrace this technology; it need not remain the distraction from learning that it has so far proved to be (Bortree and Seltzer 2009; Waters, Burnett et al. 2009; Hew 2011). Educators and researchers should look into harnessing the potential of new technologies both to develop awareness of the non-human world and of our impacts on the rest of the planet and to create action strategies for change. In fact, these media have already been influential in garnering support for social and environmental causes. After all, a Facebook conversation about a student's marine experiences will reach more people than will an oral conversation. By encouraging students to display and discuss their own photos and videos on their online social networks, we can not only empower them to teach their peers about the marine environment but also encourage them to tell their

stories digitally from an environmental perspective. (Combining digital technology with direct experience in nature is a new area of research. Digital storytelling based on direct experiences in nature could be a powerful new tool for environmental education.)

Suggestions for Future Research

Longitudinal Research

Time limitations did not allow SUYO! to be a longitudinal study in which I could follow a cohort of students. I was therefore unable to test for long-term attitude and behavior change. In the future the program should focus on one group of students with whom the researcher works multiple times over a period of years and then tracks into adulthood. This approach would allow the researcher to determine if underwater photoelicitation is successful at fostering desired changes in youth.

Land-Based Photoelicitation

The students at one school that participated in SUYO! stayed on the beach because the principal would not give permission for the class to go snorkeling. Nevertheless, this excursion was highly successful, and the students were very engaged during the class work. It would be interesting to attempt to duplicate this outcome with other land-based excursions and to ascertain if photoelicitation with this restriction could be effective in fostering change. Perhaps it is not necessary to actually go into the water in order to establish connection with the marine environment.

Sensory-Based Component

In order to heighten their ocean experiences, future programs could encourage participants to be more aware of their senses while they are snorkeling. Participants could be instructed to note the sounds of the marine environment and to think about how their bodies react to moving through the natural world. In addition they could be directed to concentrate on how they are feeling while they are swimming and to record their feelings once they are back on land. Because children learn mainly through sensory engagement and motor development, these additions to the program would particularly engage younger students (Wilson 1996).

In *Becoming Animal*, David Abram describes how growing aware of the movement of the body and its interaction with the natural world around it is key to rediscovering how we are essentially immersed in nature. "Other animals, in a constant and mostly unmediated relation with their sensory surroundings, think with the whole of their bodies." (Abram 2011, p. 189) Becoming aware of how we run and climb, jump and swim in this world and how we react to the different entities that we are presented with--trees, rocks, ocean waves, etc.--is fundamental if we are to re-discover the animal that we are (Abram 2011).

Other Participants

A future program could involve primary-aged children, who might have different reactions to the process. Their connections to nature might be stronger than with high school students, and it would be interesting to see how stronger existing connections affect the results.

In addition because of its team-building potential, this program would probably be appealing to corporate and government groups.

Chapter 9- Conclusion

SUYO!'s underwater photoelicitation was effective at fostering awareness of the marine environment. Through direct interaction and the sharing of photos, it gave participants a new way of experiencing the ocean and allowed them gain new perspectives on the underwater world. In general participants had a great deal of fun during the program—a fact that is supportive of a good learning environment.

Underwater photoelicitation was also effective at engaging participants' emotions and encouraging a sense of connection to the ocean. Adults were able to develop and explore their existing feelings, while many students were able to experience this connection for the first time. In fact, according to the qualitative data, after SUYO!, participants felt more connected to the sea and safer interacting in it.

However, underwater photoelicitation was not necessarily effective at fostering positive attitudes about the ocean. In fact, no significant positive shifts in environmental attitudes arise from the quantitative data. Although the qualitative data show that many adults and students did develop more positive attitudes about the ocean, the student quantitative data tell a different story, revealing a shift to the negative. Because of these apparently contradictory outcomes, making a conclusion about the impacts of underwater photoelicitation on attitudes is difficult.

In terms of intended behavior change, a similar pattern emerges. On the one hand, according to the qualitative data, adults and students would interact with the ocean more frequently and would be more likely to explore different parts of the ocean as a result of their having participated in SUYO!. On the other, according to the quantitative data, a slight negative change appears in the way that students would act regarding environmental issues. After SUYO! students seemed to feel *less* empowered to make positive environmental change.

The negative shift in both student attitudes and intended behavior changes speaks to the need to include an information-based component in future programs, for knowledge can lead to empowerment. Although the version of SUYO! that is the subject of this thesis fostered experience-based awareness, future versions should

provide participants with both more information about human impacts and specific guidelines about actions that they can take to further environmental goals.

In summary, although underwater photoelicitation was shown to be effective at increasing awareness and fostering a sense of connection/emotional engagement, it should incorporate an information-based component in order to encourage clear positive changes in overall environmental attitudes and intention to act. Assessing the impacts of the addition of such a component could be the next step in expanding the revolutionary environmental education technique of underwater photoelicitation.

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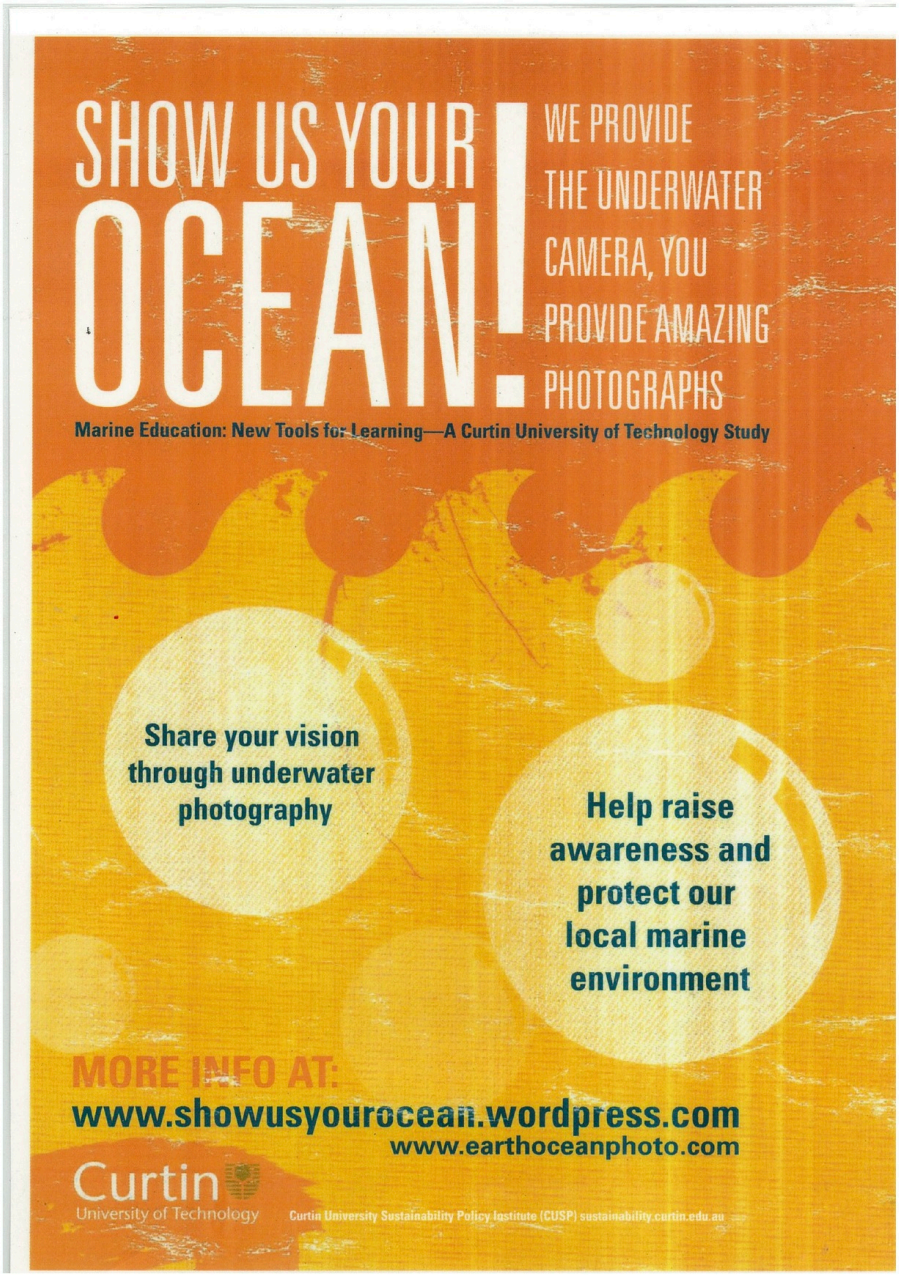
Appendix

Appendix A: Community Workshop Forms

Flyer



Community Consent Form and Information Sheet

Curtin University Sustainability Policy Institute

Sustainable Marine Education in the Southwest: A Study using

Participatory Action Research

I have read the information on the attached letter. Any questions I have asked have been answered to our/my satisfaction. I agree to participate in this research but understand that I can change my mind or stop at any time.

I understand that all information provided is treated as confidential

I agree for this interview to be taped/recorded.

In participating in this research I agree to have a buddy nearby at all times that I am in the water taking pictures.

I agree that research gathered for this study may be published provided names or any other information that may identify me/us is not used.

Participant Statement	Please Sign Box
I can swim well e.g. to gold medallion standard	
I (and my buddy) know/will know how to provide help in case of an emergency	
I (and my buddy) will have a phone number for emergency help if needed	
I have read the snorkeling safety guide and emergency contact information sheet	

Name

Date Signature

Investigator- Steve Andrews Signature

Supervisor- Dr. Laura Stocker Signature

Curtin University of Technology
School of Humanities
Curtin University Sustainability Policy Institute

Participant Information Sheet

(STAGE 1- PHOTOELICITATION STUDY)

My name is Steve Andrews and I am currently completing a piece of research for my PhD in Marine Sustainability at Curtin University of Technology.

Purpose of Research

I am investigating the role environmental education plays in achieving sustainability. I am particularly interested in new methods of education that involve direct interaction with the marine environment. People often learn more deeply from an interaction or an experience, rather than from a book or a lecture. The purpose of my research is to find new ways of learning about our marine environment through direct experience.

Your Role

I am interested in finding out what role underwater photography can have as an educational tool. As an experienced underwater photographer myself, I know what effect it has had on me, and I would like to find out what effect the experience of underwater photography has on other people.

I will ask you to take underwater photographs with a re-useable digital underwater camera (which I will provide). You may take pictures of anything you see in the water; whether you are snorkeling, swimming, surfing, diving, etc.

If you would like to participate, I will ask you to come to a workshop (1 hour) explaining the basics of underwater photography. I will then distribute the cameras and you will have two months to take a roll of film.

At the workshop, you will also choose a date for a one-on-one interview after you have collected your pictures. Prior to the interview, I will download the images from the camera. The interview process will take approximately one hour. We will examine and discuss your pictures and you will choose your three favorite pictures. The cameras will then be returned and prints will be made of your best pictures.

After the interview, I will hold one more workshop (1-2 hours), which will bring all participants together (up to 20 participants) to discuss their pictures and their experiences in the water. We will use your favorite 3 pictures for discussion.

Consent to Participate

Your involvement in the research is entirely voluntary. You have the right to withdraw at any stage without it affecting your rights or my responsibilities. When you have signed the consent form I will assume that you have agreed to participate and allow me to use your data in this research.

We do not want you to take risks, you acknowledge that you are a competent swimmer and that you will not put yourself in danger to take the photographs. ***It is very important that you have a buddy nearby when engaging in any water-based activity. This buddy must know what to do in case of an accident and should be able to help if needed. This buddy may be in a***

boat, on shore or in the water with you but needs to be able to help you if you need help. It is also important that you know the nearest place to get help.

It is highly unlikely that there will be anything distressing for you in this project, but if you do have an unpleasant experience we will and assist you at the time and give you the names of independent counselors to contact.

Confidentiality

The information you provide will be kept separate from your personal details, and I will only have access to this. The interview transcript will not have your name or any other identifying information on it and in adherence to university policy, the interview tapes and transcribed information will be kept in a locked cabinet for five years, before it is destroyed.

Further Information

This study as been approved by the Curtin University Human research Ethics Committee (Approval Number HR 130/2009). If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University of Technology, GPO Box U1987, Perth, 6845 or by telephoning 9266 2784 or by emailing hrec@curtin.edu.au.

Thank you very much for your involvement in this research, your participation is greatly appreciated

Snorkeling Safety Checklist (Courtesy of http://www.danseap.org/)

SNORKELING SAFETY

Snorkeling is a wonderful pastime that provides a relatively easily accessible window to the underwater world and that is enjoyed safely by millions of people of a wide variety of ages. However, snorkeling does present some risks to the unwary, and sometimes to the experienced. Snorkeling is conducted in a potentially hostile and changeable environment that can sometimes feature rough seas, cold water and strong currents. It also brings you into close contact with marine animals, which, in defending themselves, can sometimes cause you harm. Powerboats can also present potential danger.

In addition, you need to be in good health, and fit enough to safely meet the physical demands of snorkeling. Certain medical conditions may lead to complications while snorkeling. If you have breathing problems such as asthma, a cardiac condition, problems with your ears or sinuses, or any other medical problems, seek advice from your doctor before taking up snorkeling.

GETTING STARTED

* ***Snorkeling can be physically strenuous.*** Ensure you have an adequate level of fitness.

* ***You should generally be a competent swimmer to take up snorkeling.*** A poor swimmer can sometimes snorkel relatively safely with the aid of a buoyancy jacket, but this requires care and close supervision.

* ***Certain medical conditions would disqualify you from snorkeling on grounds of safety.*** Consult a doctor who understands the demands of snorkeling to

ensure you are medically fit.

* ***Consider a formal snorkeling course.*** Such a course will ensure that you are taught the necessary skills, are informed of the risks associated with snorkeling, and it will advise on the selection of equipment.

* ***Before you progress from shallow water (1.5m) you should be able to comfortably perform***

these skills:

* Snorkel breathing and clearing;
* Mask clearing;
* Duck diving;
* Ear clearing; and
* Weight belt ditching (if a weight belt is necessary).

* ***Know the marine life in your region that could pose problems;*** what potential risks they present, how to minimize these risks, and what to do if an injury occurs.

* ***Don't dive if you are unwell.*** Even a cold will seriously impair you.

* ***Be well-rested, well-fed, and well-hydrated.***

* ***Snorkel with a buddy.***

* ***Your breathhold time should be well within your limits of comfort.*** Do not force it, as it is possible to blackout without warning.

* ***Do not hyperventilate.*** (A series of forceful deep breaths prior to holding your breath.) You risk blackout without any warning.

* ***Do not breathhold dive into or under any overhead environment*** (cave, wreckage, overhand)where you risk being trapped.

* ***Never snorkel at night unless adequately prepared*** with equipment and the conditions are stable.

* ***Inform others that you are going snorkeling.*** Tell them your intended location and approximate return time.

* ***Do not snorkel in areas where obvious dangers exist.*** Examples are areas with strong current, water with poor visibility, places where others are fishing, or area with a lot ofboat traffic.

* ***Follow a "look but don't touch" policy.*** In this way you minimise the risk of injury from marine organisms, and you will avoid damaging fragile marine growth.

* ***If you begin to feel tired, cold or uncomfortable, terminate your dive.***

But, most of all, enjoy the fantastic opportunities that snorkeling has to offer.

Yours in dive safety,

Divers Alert Network

(Dive & Snorkel Safety Tips Contributed by Stan Bugg & John Lippmann)

Emergency Guide and Contact Information

In case of an emergency, make sure that you and your buddy are safely inshore before contacting emergency medical personnel. In case of potential spinal injury and injuries that are serious but not immediately life-threatening minimize movement of the victim and call the number below. It is highly recommended to take training in first aid prior to snorkeling. A list of counselors will also be available at request of the participant.

For first aid and further dive qualifications please visit your local dive shop.

Cape Dive
Dunsborough
Shop 2 / 222 Naturaliste Tce
Phone: +61 8 9756 8778

The Dive Shed
Busselton
21A Queen Street
Phone: +61 8 9754 1615

EMERGENCY CONTACT NUMBERS

In case of *snorkeling* emergency dial: 000

In case of *diving* emergency call DAN: 1800-088 200

Dive Doctors

Dr. John Geoff Taylor
Busselton Medical Practice
21 Albert St
Busselton WA 6280
Telephone: (08) 9752 1133

Hospitals

Margaret River Hospital
Farrelly Street, Margaret River WA 6285

Busselton Hospital
Mill Road, Busselton WA 6280

Participant Questionnaire

Show Us Your Ocean! Participant Questionnaire

Name: Occupation: Age:

Please describe your relationship to the marine environment:

How did you experience your photo taking?

What kinds of new experiences have you had?

In what ways if any do you now see the ocean differently? Why and how?

Can you describe your learning from this experience? (any type of learning)

Did you have any emotional reactions to any of the experiences or pictures that you saw/took?

Did participating in the workshop change your views of your own pictures? What reactions did you have twoards other people's pictures?

Do you think that any of your attitudes towards the ocean might change because of this experience?

Do you think your interactions with the ocean might change because of your experiences?

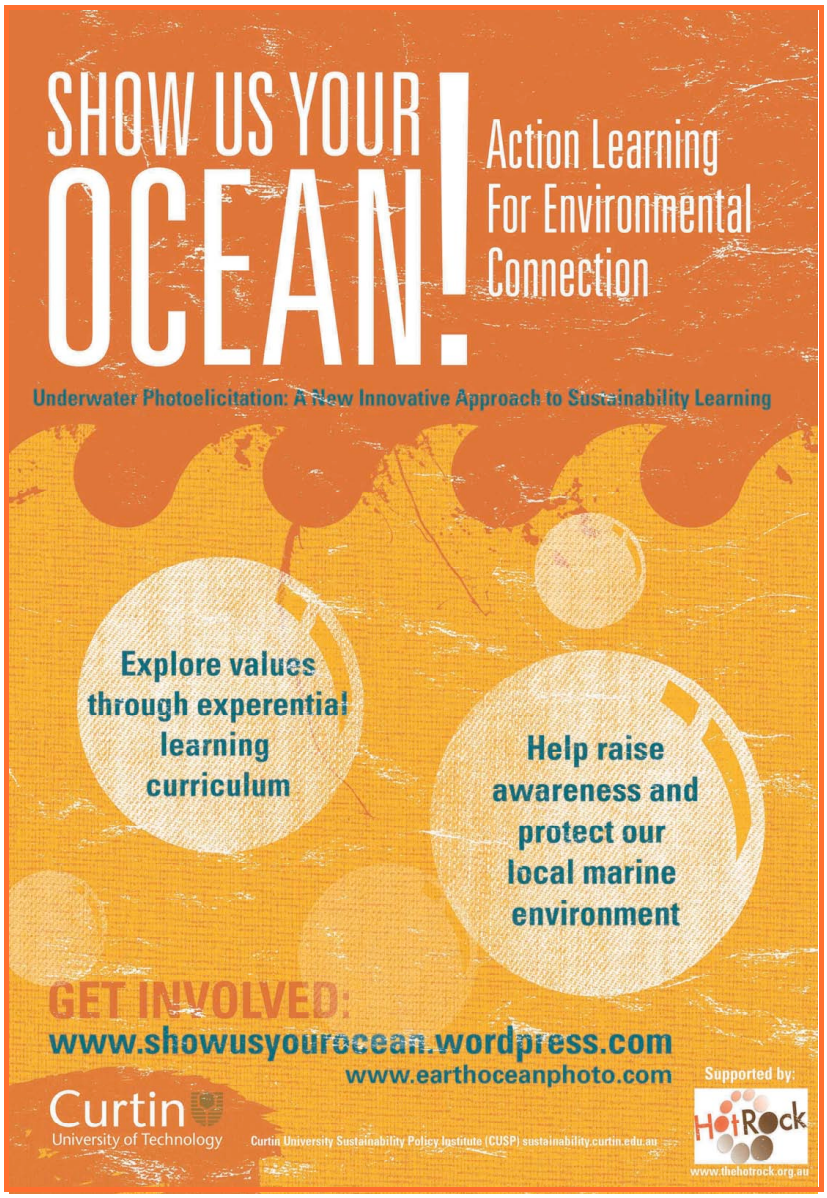
How would you describe the usefulness of this approach for student learning?

Would you have done anything differently? Would you have rather taken video or pictures?

Overall, was it a valuable experience?

Appendix B: SCHOOL FORMS

Flyer



Show Us Your Ocean!

SOSE Underwater Photoelicitation Curriculum Module

Are you interested in testing a revolutionary environmental education technique with your SOSE class?

We will provide a 4-5 hour curriculum module tailored for SOSE year 10.

We will supply your class with reusable digital underwater cameras.

We will go on a field trip to a local beach, snorkel and take pictures.

We will assist with risk assessment and logistics.

This is a technique that engages students in an experience where they interact directly with their environment. Pictures help elicit emotion and sharing pictures as a group helps widen perspectives. The pictures students take will be theirs to keep, to look at and remember how they experienced the ocean.

This module is different from traditional lessons because students will create their own experiences before any information is given to them about the ocean. This will allow them to understand and explore their own connection to the ocean before the teaching part of the module begins. Experience first, then teach rather than teach first, then experience.

To find out more and join in our study please go to:

www.showusyourocean.wordpress.com

A PhD Project from CUSP (sustainability.curtin.edu.au)

Curtin University of Technology

Supported by HotRock

www.thehotrock.org.au

Teacher Information Sheet and Consent Form

Curtin University of Technology
School of Humanities
Curtin University Sustainability Policy Institute

My name is Steve Andrews and I am currently completing a piece of research for my PhD in Marine Sustainability at Curtin University of Technology.

Purpose of Research

I am investigating the role environmental education plays in achieving sustainability. I am interested in new methods of education that involve direct interaction with the marine environment. People often learn more deeply from an interaction or an experience, rather than from a book or a lecture. The purpose of my research is to find new ways of learning about our marine environment through direct experience.

I have written (along with HotRock), a four hour curriculum module designed to test underwater photoelicitation in a SOSE classroom. Underwater photoelicitation involves students snorkeling and taking pictures of what they see (on a class field trip to the beach), then returning to the classroom and discussing and sharing their photos and experiences in groups and as a class.

Your Role

- You will teach the curriculum module with my assistance
- I will lend your students waterproof cameras
- We will go to the beach as a class fieldtrip
- They will take underwater pictures and pictures of the ocean/coast
- We will come back to the classroom and discuss their experiences and the pictures that they took
- If you consent, I will use this data for my PhD research
- If you choose not to consent, you can still participate in the activities (pending parent permission) and I will not use your data in my research

If students are not comfortable snorkeling, then they may take pictures of the beach/coast. Your role during this module will be the same as a typical class activity. I will be present to assist you with the module materials and assist students, but you will be in charge of the class just like any other class activity. A list of emergency contacts is provided if any of the students have an emergency during the fieldtrip. A good reference for water safety is the Department of Education's Guide for Water Based Activities (Section 19).

Consent to Participate

Your involvement in the research is entirely voluntary. When you have signed the consent form I will

assume that you have agreed to participate and allow me to use your data in this research, however you can stop at any time without giving a reason.

We do not want your students to take risks. You acknowledge that you will be responsible for your class. ***It is very important that each student have a buddy nearby when engaging in any water-based activity. This buddy must know what to do in case of an accident and should be able to help if needed. If there is an emergency, they will come to you.***

It is highly unlikely that there will be anything distressing for you in this project, but if you do have an unpleasant experience we will assist you at the time and help you get further help if you need it.

Confidentiality

The information you provide will be kept separate from your personal details, and my supervisor and I will only have access to this. The interview transcript will not have your name or any other identifying information on it and in adherence to university policy, the interview tapes and transcribed information will be kept in a locked cabinet for five years, before it is destroyed. We will not have access to any personal information. If information is included in articles/papers, no personal information will be available to link you to pictures.

Further Information

This study as been approved by the Curtin University Human research Ethics Committee (Approval Number HR 139/2010). If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University of Technology, GPO Box U1987, Perth, 6845 or by telephoning 9266 2784 or by emailing hrec@curtin.edu.au.

Thank you very much for your involvement in this research; your participation is greatly appreciated

Snorkeling Safety Checklist (Courtesy of http://www.danseap.org/)

SNORKELING SAFETY

Snorkeling is a wonderful pastime that provides a relatively easily accessible window to the underwater world and that is enjoyed safely by millions of people of a wide variety of ages. However, snorkeling does present some risks to the unwary, and sometimes to the experienced. Snorkeling is conducted in a potentially hostile and changeable environment that can sometimes feature rough seas,

cold water and strong currents. It also brings you into close contact with marine animals, which, in defending themselves, can sometimes cause you harm. Powerboats can also present potential danger. In addition, you need to be in goodhealth, and fit enough to safely meet the physical demands of snorkeling. Certain medical conditions may lead to complications while snorkeling. If you have breathing problems such as asthma, a cardiac condition, problems with your ears or sinuses, or any other medical problems, seek advice from your doctor before taking up snorkeling.

GETTING STARTED

* ***Snorkeling can be physically strenuous.*** Ensure you have an adequate level of fitness.
* ***You should generally be a competent swimmer to take up snorkeling.*** A poor swimmer can sometimes snorkel relatively safely with the aid of a buoyancy jacket, but this requires care and close supervision.
* ***Certain medical conditions would disqualify you from snorkeling on grounds of safety.*** Consult a doctor who understands the demands of snorkeling to ensure you are medically fit.
* ***Consider a formal snorkeling course.*** Such a course will ensure that you are taught the necessary skills, are informed of the risks associated with snorkeling, and it will advise on the selection of equipment.
* ***Before you progress from shallow water (1.5m) you should be able to comfortably perform these skills:***
 * Snorkel breathing and clearing;
 * Mask clearing;
 * Duck diving;
 * Ear clearing; and
 * Weight belt ditching (if a weight belt is necessary).
* ***Know the marine life in your region that could pose problems;*** what potential risks they present, how to minimize these risks, and what to do if an injury occurs.
* ***Don't dive if you are unwell.*** Even a cold will seriously impair you.
* ***Be well-rested, well-fed, and well-hydrated.***
* ***Snorkel with a buddy.***
* ***Your breathhold time should be well within your limits of comfort.*** Do not force it, as it is possible to blackout without warning.
* ***Do not hyperventilate.*** (A series of forceful deep breaths prior to holding your breath.) You risk blackout without any warning.
* ***Do not breathhold dive into or under any overhead environment*** (cave, wreckage, overhand)where you risk being trapped.
* ***Never snorkel at night unless adequately prepared*** with equipment and the conditions are stable.
* ***Inform others that you are going snorkeling.*** Tell them your intended location and approximate return time.
* ***Do not snorkel in areas where obvious dangers exist.*** Examples are areas with strong current, water with poor visibility, places where others are fishing, or area with a lot of boat traffic.

* ***Follow a "look but don't touch" policy.*** In this way you minimise the risk of injury from marine organisms, and you will avoid damaging fragile marine growth.
* ***If you begin to feel tired, cold or uncomfortable, terminate your dive.***
But, most of all, enjoy the fantastic opportunities that snorkeling has to offer.

Yours in dive safety,
Divers Alert Network
(Dive & Snorkel Safety Tips Contributed by Stan Bugg & John Lippmann)

Emergency Guide and Contact Information

In case of an emergency, make sure that you and your buddy are safely inshore before contacting emergency medical personnel. In case of potential spinal injury and injuries that are serious but not immediately life-threatening minimize movement of the victim and call the number below. It is highly recommended to take training in first aid prior to snorkeling. A list of counselors will also be available at request of the participant.

For first aid and further dive qualifications please visit your local dive shop.

Cape Dive
Dunsborough
Shop 2 / 222 Naturaliste Tce
Phone: +61 8 9756 8778

The Dive Shed
Busselton
21A Queen Street
Phone: +61 8 9754 1615

EMERGENCY CONTACT NUMBERS

In case of *snorkeling* emergency dial: 000

In case of *diving* emergency call DAN: 1800-088 200

Dive Doctors

Dr. John Geoff Taylor

Busselton Medical Practice
21 Albert St
Busselton WA 6280
Telephone: (08) 9752 1133

Hospitals

Margaret River Hospital
Farrelly Street, Margaret River WA 6285

Busselton Hospital
Mill Road, Busselton WA 6280

Teacher Consent Form

Curtin University Sustainability Policy Institute

Underwater Photoelicitation: A New Experiential Marine Education Technique

I have read the information on the attached letter. Any questions I have asked have been answered to our/my satisfaction. I agree to complete the module and fieldtrip with my class. I agree to participate in this research but understand that I can change my mind or stop at any time.

I understand that all information provided is treated as confidential

I agree for the interview to be taped/recorded and to the in class audio recording.

I agree that research gathered for this study may be published provided names or any other information that may identify me/us is not used.

Participant Statement	Please Sign Box
We will adhere to the Department of Education's Guidelines for Water Based Activities	
I know/will know how to provide help in case of an emergency and will supervise the fieldtrip	

I have read the snorkeling safety guide and emergency contact information sheet	

Name

Date Signature

Investigator- Steve Andrews Signature

Supervisor- Dr. Laura Stocker Signature

Student Consent Form

Curtin University Sustainability Policy Institute

Underwater Photoelicitation: A New Experiential Marine Education Technique

I have read the information on the attached letter. Any questions I have asked have been answered to our/my satisfaction. I agree to participate in this research but understand that I can change my mind or stop at any time.

I understand that all information provided is treated as confidential.

I agree to be audio taped (during the class discussion) and my worksheets analysed (with names removed). I also agree to appear in pictures documenting the lessons and fieldtrip (names excluded unless asked otherwise).

In participating in this research I agree to have a buddy nearby at all times that I am in the water taking pictures.

I agree that research gathered for this study may be published provided names or any other information that may identify me/us is not used.

Participant Statement	Please Sign Box
I can swim well e.g. to gold medallion standard	
I (and my buddy) know/will know to go to my teacher in case of an emergency	
I have read the snorkeling safety guide and emergency contact information sheet	

Name

Date Signature

Investigator- Steve Andrews Signature

Supervisor- Dr. Laura Stocker Signature

Parent Permission Form

Curtin University of Technology
School of Humanities
Curtin University Sustainability Policy Institute

My name is Steve Andrews and I am currently completing a piece of research for my PhD in Marine Sustainability at Curtin University of Technology.

Purpose of Research

I am investigating the role environmental education plays in achieving sustainability. I am particularly interested in new methods of education that involve direct interaction with the marine environment. People often learn more deeply from an interaction or an experience, rather than from a book or a lecture. The purpose of my research is to find new ways of learning about our marine environment through direct experience.

Student Role

I am interested in finding out what role underwater photography can have as an educational tool. As an experienced underwater photographer myself, I know what effect it has had on me, and I would like to find out what effect the experience of underwater photography has on other people.

A four day high school curriculum module has been designed to test underwater photoelicitation in a classroom setting. Underwater photoelicitation involves students snorkeling and taking pictures of what they see (on a class field trip to the beach), then returning to the classroom and discussing and sharing their photos and experiences in groups and as a class. Group discussions will be audio recorded and pictures documenting the lessons and fieldtrip will be taken.

- I will give the students waterproof cameras
- We will go to the beach as a class fieldtrip
- They will take underwater pictures and pictures of the ocean/coast
- We will come back to the classroom and discuss their experiences and the pictures that they took
- If you consent, your student will be able to participate in the fieldtrip and class activities
- If you choose not to consent, there will be an alternative activity at the school for the students

Consent to Participate

You give permission for your child to go on the fieldtrip and to partake in classroom activities analyzing and discussing their pictures and experiences. If your student does not want to go in the water, then they may take pictures of the beach/coast. They do not have to enter the water.

Further Information

This study as been approved by the Curtin University Human research Ethics Committee (Approval Number HR 139/2010). If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University of Technology, GPO Box U1987, Perth, 6845 or by telephoning 9266 2784 or by emailing hrec@curtin.edu.au.

Thank you very much for your involvement in this research, your participation is greatly appreciated

	Signature
I agree to the terms of research and allow for my child to participate on the beach/snorkeling fieldtrip if he/she wants to	

Pre SUYO! Survey

Show Us Your Ocean! Underwater Photoelicitation Module **(SCHOOLS)**

Pre-module Survey

Steve Andrews, PhD Candidate

Curtin University Sustainability Policy Institute

Thank you for filling out this survey!

A. Name: _____
B. School: _____
C. Year in school:_____
D. Date: _____
E. My course of study is: _____
F. After high school I plan to- tick one
   ____ Get a job and start work

   ____ Attend TAFE or university

   ____ Other- please name: _____

G. Gender: _____M _____F
H. Age:_____
I. My home postcode_____
J. I have lived in the Perth area for ____ years ___months
K. I have lived in a coastal community like Perth for
   ___ Less than one year

   ___ 1-2 years

   ___ 3-4 years

   ___ 4-5 years

   ___ More than 5 years

   My parents occupation _____

L. I was born in Australia- (circle one) Yes No: Where were you born?
   _____
M. I go fishing: Yes No
N. Last month I spent the most outings doing- tick one:
   ____ Marine outdoor things

   ____ Terrestrial (land based) outdoor things

O. My cultural heritage- tick one or two:
   ___ Aboriginal

   ___ African

   ___ Asian

   ___ European descent

___ Pacific Islander

___ South American

___ Torres Strait Islander

___ Other- please name _____

P. My parents education level- tick one:
___ Some high school

___ High school graduate

___ Some University or TAFE

___ University or TAFE degree

___ Completed post-graduate degree

Q. Watersports (paddling, surfing, sailing, windsurfing, etc.) are my favorite pastimes- tick one
___ Yes

___ No

R. Snorkeling experience- tick one:
___ Never

___ Seldom (1-5 times per year)

___ Often (5-9 times per year)

___ Very often (more than 10 times per year)

___ Certified SCUBA diver

S. Swimming experience (in pools, etc.) – tick one
___ Can't swim

___ Can swim a little, but never do

___ Seldom (1-5 times per year)

___ Sometimes (between 5-11 times per year)

___ Often (at least once a month)

T. I spend a lot of time at the beach or in the marine environment such as boating, diving or fishing- tick one
___Yes

___ No

U. At the beach or in the marine environment each month, I spend (tick best):
___ less than one hour

___ 1-2 hours

___ 2-3 hours

___ 3-4 hours

___ 4-5 hours

___ more than 5 hours

V. Outside hiking, bird watching, camping, mountain biking, etc. each month, I spend (tick best):

___ less than one hour

___ 1-2 hours

___ 2-3 hours

___ 3-4 hours

___ 4-5 hours

___ more than 5 hours

AA. The most important activity to me is (answer all if possible, rank activities in order of your personal opinion, 7 highest to 1 lowest

____ Beach or marine activity (beach, swimming, snorkeling, fishing, boating, etc.

____ Forest or terrestrial activity (camping, hiking, bird-watching, biking, etc.)

____ Computer related activity

____ Television or entertainment related activity (TV, music, etc.)

____ Social activities (parties, outings, etc.)

____ Sports (outdoors)

____ Sports (indoors)

BB. I play video games- tick one:

____ Yes

____ No

CC. I bird watch- tick one:

____ Yes

____ No

DD. I go hiking- tick one:

____ Yes

____ No

EE. I go mountain biking- tick one:

____ Yes

____ No

FF. I like to watch nature documentaries on TV- tick one:

___ Yes

___ No

GG. Please rank items listed below. Rank in the order "you" do these things (answer all if possible, "10 the most" and "1 least", 0 if you don't do at all):

___ Surf the internet

___ Use email

___ Play sport

___ Play LAN/online games with friends

___ Use facebook

___ Watch Discovery channel (or other nature channel)

___ Watch other nature documentaries

___ Watch other Pay TV

___ Use a mobile phone

___ Other- please name:_____

HH. I am/was a member of an environmental group- tick one:

____ Yes

____ No

II. My parents are/were members of an environmental group- tick one:

___ Yes

___ No

JJ. My family uses a compost bin at home- tick one:

___ Yes

___ No

KK. My family is conscious and saves energy- tick one:

___ Yes

___ No

LL. My family recycles material whenever possible- tick one:

___ Yes

___ No

MM. Outdoor camping experience- tick one:

___ Never

___ Little (once every few weeks)

___ Sometimes (once a year)

___ Often (2-10 times per year)

___ Very much (once a month or more)

SUYO! Student Workbook

Show Us Your Ocean!

Photoelicitation Workbook

Name:

Lesson 1

The Ocean and You

NAME : DATE :

1. What does the ocean mean to you?

_____

___

_____

____

_____

____

2. What is your earliest memory of the sea?

_____

___

_____

____

_____

____

3. How often do you visit the sea (circle the most appropriate)?

a. once a year
b. once a month
c. once a week
d. more than once a week
e. every day

4. What do you do most often at the sea?

_____

__

_____

____

_____

____

5. Have you had an experience that suddenly changed how you felt about the ocean? If yes please explain.

_____

__

_____

____

_____

____

6. Do you have any fears about the ocean? If yes, explain briefly.

_____

__

_____

____

_____

____

7. What threats do you think the sea faces?

_____

__

Lesson 1

Introduction to Underwater Photography and Safe Snorkelling

NAME : DATE :

EXPERIENTIAL EDUCATION

Experiential environmental education is an education technique that uses experience to teach, rather than books or lectures alone. It's about getting people out there experiencing their environment. It's about having fun and learning from other people's experiences as well as your own.

This lesson involves you going out and taking pictures of the ocean. You will share your experiences and pictures with the class.

Snorkelling Safety Checklist (Courtesy of http://www.danseap.org/)

Snorkelling is a wonderful pastime that provides an easily accessible window to the underwater world and that is enjoyed safely by millions of people of a wide variety of ages. However, snorkelling does present some risks to the

unwary, and sometimes to the experienced. Snorkelling is conducted in a potentially hostile and changeable environment that can sometimes feature rough seas, cold water and strong currents. It also brings you into close contact with marine animals, which, in defending themselves, can sometimes cause you harm. Powerboats can also present potential danger.

In addition, you need to be in good health, and fit enough to safely meet the physical demands of snorkelling. Certain medical conditions may lead to complications while snorkelling. If you have breathing problems such as asthma, a cardiac condition, problems with your ears or sinuses, or any other medical problems, seek advice from your doctor before taking up snorkelling.

GETTING STARTED

- ***Snorkelling can be physically strenuous.*** Ensure you have an adequate level of fitness.
- ***You should generally be a competent swimmer to take up snorkelling.*** A poor swimmer can sometimes snorkel relatively safely with the aid of a buoyancy jacket, but this requires care and close supervision.
- ***Certain medical conditions would disqualify you from snorkelling on grounds of safety.*** Consult a doctor who understands the demands of snorkelling to ensure you are medically fit.
- ***Consider a formal snorkelling course.*** Such a course will ensure that you are taught the necessary skills, are informed of the risks associated with snorkelling, and it will advise on the selection of equipment.***Before you progress from shallow water (1.5m) you should be able to comfortably perform these skills:***
    - Snorkel breathing and clearing;
    - Mask clearing;
    - Duck diving;
    - Ear clearing; and
    - Weight belt ditching (if a weight belt is necessary).
- ***Know the marine life in your region that could pose problems;*** what potential risks they present, how to minimize these risks, and what to do if an injury occurs.
- ***Don't dive if you are unwell.*** Even a cold will seriously impair you.
- ***Be well-rested, well-fed, and well-hydrated.***

- ***Snorkel with a buddy.***
- ***Your breathhold time should be well within your limits of comfort.*** Do not force it, as it is possible to blackout without warning.
- ***Do not hyperventilate.*** (A series of forceful deep breaths prior to holding your breath.) You risk blackout without any warning.
- ***Do not breathhold dive into or under any overhead environment*** (cave, wreckage, overhand) where you risk being trapped.
- ***Never snorkel at night unless adequately prepared*** with equipment and the conditions are stable.
- ***Inform others that you are going snorkelling.*** Tell them your intended location and approximate return time.
- ***Do not snorkel in areas where obvious dangers exist.*** Examples are areas with strong current, water with poor visibility, places where others are fishing, or area with a lot of boat traffic.
- ***Follow a "look but don't touch" policy.*** In this way you minimise the risk of injury from marine organisms, and you will avoid damaging fragile marine growth.
- ***If you begin to feel tired, cold or uncomfortable, end your dive.***
- *But, most of all, enjoy the fantastic opportunities that snorkelling has to offer.*

Yours in dive safety,

Divers Alert Network

(Dive & Snorkel Safety Tips Contributed by Stan Bugg & John Lippmann)

SNORKELLING WORKSHEET

SNORKELLING QUESTIONS

1. What are four snorkelling skills should you be able to demonstrate?

1)

2)

3)

4)

2. What medical conditions might disqualify you from snorkelling?

3. How often can you snorkel alone?

CAMERA INFORMATION AND TUTORIAL

You will be using re-usable digital underwater cameras. These cameras are YOUR responsibility to take care of when you are using them under and out of the water.

Camera Tutorial (step-by-step)

1) Turn on camera (top button on back of camera)
2) Make sure camera is in still-mode (TELL WHICH BUTTON)
3) Take picture

Rule # 1

- **Don't Get Frustrated**, good pictures are rare underwater.
- Therefore, take **AS MANY** as you can (fill the memory card).
- The camera will hold 15-25 pictures with 3MP.
- And, shoot **in a SERIES (find a subject).**

Rule # 2

- **Be between a full arms length and a whole body length away from subject.**
- Normally you will get as close as you can to your subject but…..these cameras are different!
- **Further than 1m but usually closer than 3m.**

Rule # 3

- **Minimize subject movement.**
- Do not take close pictures of moving objects (seagrass, etc.)
- If you want to take a picture of a fish, track the movement of the fish to minimize blur.

Rule # 4

- **Minimize Movement of Yourself!!!**
- Cameras tend to blur so if you want to take a picture….
- Stop in the water and track your subject!

- Do not swim and take pictures..this will lead to blurry, out of focus images

Rule # 5

- **Shoot with ample sunlight and clear, calm conditions**
- Shoot away from the sun unless you want to get a silhouette (hard with these cameras so don't try too many pics)

Snorkelling Equipment Checklist

- Snorkel & Mask
- Camera
- Fins
- Swimsuit or wetsuit

Underwater Photography Snorkeling Fieldtrip

At the Snorkel site

1. What is the current weather (amount of sun, wind, precipitation)?

_____

___

_____

___

_____

___

_____

___

2. What do you smell?

_____

___

_____

___

3. What does the ground look like?

_____

___

_____

___

,

_____

___

_____

___

5. What can you hear?

_____

___

_____

___

6. What does the ocean look like? What is the visibility like?

_____

___

_____

___

7. What is the water temperature like?

_____

___

_____

___

8. How do you feel in this place?

_____

___

_____

___

_____

___

9. Describe three features that you think are significant.

1)
2)
3)

Remember to keep an eye on your buddy whilst you're snorkelling

Lesson 3 Task Sheet

Picture download in computer lab & first analysis

Today you will download your pictures from your camera and choose three of your favourite pictures. Out of these three you will chose your favourite picture. Create a PowerPoint presentation with the three pictures that you choose.

Creating the PowerPoint

1) Connect the cameras to the computer.
2) Create a new file on desktop called (LAST NAME_ underwater pictures).
3) Open the pictures in Windows Picture Viewer and look through them.
4) Pick your 3 favourite pictures.
5) Open up PowerPoint and make three blank slides.
6) Import the pictures (one per slide).
7) Create a textbox on each picture and answer these questions in the textbox for each picture.
    - What is the subject of the picture?
    - Why did you take the picture?
    - What artistic elements/effects do you see in the picture?
    - What emotions do you feel from the picture?

When you have created the PowerPoint with your three favourite pictures and written the captions (in text-boxes), choose your favourite picture out of these. Take the original picture file (without captions) and save it into the folder where you have saved your PowerPoint. You should have two files now in that folder: Your PowerPoint and your favourite picture (the original picture).

Now that you have the completed files, save them to your camera's hard drive. Hand your camera back in to your teacher along with the completed worksheet.

L4 – Task Sheet

Our Underwater Pictures

Today we will share and discuss each other's favourite pictures.

You need to sit in your snorkelling groups.

Each group will have a sheet with each of your favourite pictures on it (4 pictures in total).

You will discuss each other's favourite pictures. Discuss one photo at a time and answer the questions as a group. The person whose photo it is can act as scribe and write down the groups' responses on the worksheet. Remember these are the questions you will be discussing.

- What do you think the subject of the picture is?
- What artistic elements/effects do you see in the picture?
- What emotions do you feel from the picture?

Once you are finished, choose one picture from the four to share with the class. The person who took the picture will give their thumb drive to the teacher and the teacher will project the photo chosen by each group to the class. Discuss each photo as a class.

Your final task is to complete the creative writing project below for homework.

Final Project – Creative Writing Assignment

Using your pictures and your experiences, please complete a short creative writing assignment. This assignment should describe your experience in the ocean. You can write a poem or a short-story. You could use one of your pictures and write a story about the animals in the picture. You could write a short play or write a song. You could also choose to present to the class if you would like after you hand your assignment in. Please limit the assignment to 500 words.

School Pre/Post SUYO! Questionnaire

Name_____

School_____

The following questions are about your opinions. Please rate the extent to which you agree or disagree with each statement by circling one number.

1=strongly disagree 2=somewhat disagree 3=mildly disagree 4=mildly agree
5=somewhat disagree 6=strongly agree

1a. My connection to nature and the environment is a part of my spirituality
Strongly Disagree 1 2 3 4 5 6 Strongly Agree

1b. My connection to the ocean is a part of my spirituality
Strongly Disagree 1 2 3 4 5 6 Strongly Agree

2a. My relationship to nature is an important part of who I am
Strongly Disagree 1 2 3 4 5 6 Strongly Agree

2b. My relationship to the ocean is an important part of who I am
Strongly Disagree 1 2 3 4 5 6 Strongly Agree

3. I feel connected to all living things and the earth
Strongly Disagree 1 2 3 4 5 6 Strongly Agree

4. I am not separate from nature, but a part of nature
Strongly Disagree 1 2 3 4 5 6 Strongly Agree

5. I always think about how my actions affect the environment

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

6. I always think about how my actions affect the ocean

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

7. I am very aware of environmental issues

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

8. I am very aware of ocean environmental issues

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

9. I think a lot about the suffering of land animals

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

10. I think a lot about the suffering of ocean animals

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

11. Even in the middle of the city, I notice nature around me

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

12. My feelings about nature do not affect how I live my life

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

13. Humans have the right to use the oceans any way we want

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

14. Ocean conservation is unnecessary because our oceans are strong enough to recover from any human impact

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

15. Whales, dolphins and fish have fewer rights than humans

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

16. Some species are just meant to die out or become extinct

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

17. Nothing I do will change problems in other places on the planet

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

18. The state of nonhuman species is an indicator of the future for humans

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

19. The thought of being deep in the woods, away from civilization, is frightening

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

20. The thought of being out on the open ocean, far from land, is frightening

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

21. My ideal vacation spot would be a remote, wilderness area

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

22. My ideal vacation spot would be close to the ocean

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

23. I enjoy being outdoors, even in unpleasant weather

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

24. I enjoy the ocean, even in winter

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

25. I don’t often go out in nature

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

26. I don’t often visit the ocean

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

27. I don’t often swim in the ocean

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

28. I enjoy digging in the earth and getting dirt on my hands

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

29. I enjoy swimming in the ocean and getting salty from the sea

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

30. I take notice of wildlife wherever I am

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

31. I take notice of marine life when I go to the beach

Strongly Disagree 1 2 3 4 5 6 Strongly Agree